



US009049969B2

(12) **United States Patent**  
**Cook**

(10) **Patent No.:** **US 9,049,969 B2**  
(45) **Date of Patent:** **\*Jun. 9, 2015**

(54) **SHOWER ENCLOSURE DESIGN AND  
ASSEMBLY METHODS USING  
PREFABRICATED SHOWER BENCHES**

(71) Applicant: **Tile Redi, LLC**, Coral Springs, FL (US)

(72) Inventor: **Joseph R. Cook**, Parkland, FL (US)

(\*) Notice: Subject to any disclaimer, the term of this  
patent is extended or adjusted under 35  
U.S.C. 154(b) by 0 days.  
  
This patent is subject to a terminal dis-  
claimer.

1,684,503 A	9/1928	Nilson
1,873,424 A	8/1932	Kerr et al.
2,025,814 A	12/1935	Goss
2,055,173 A	9/1936	Deubelbeiss
2,145,215 A	1/1939	Sakier
2,197,874 A	4/1940	Myers
2,400,683 A	9/1944	Burnett

(Continued)

#### FOREIGN PATENT DOCUMENTS

EP	0333168	9/1989
FR	2701828	9/1994

(Continued)

(21) Appl. No.: **13/674,716**

(22) Filed: **Nov. 12, 2012**

#### (65) Prior Publication Data

US 2013/0125362 A1 May 23, 2013

#### Related U.S. Application Data

(63) Continuation of application No. 12/706,792, filed on  
Feb. 17, 2010, now Pat. No. 8,307,582.

#### (51) Int. Cl.

<b>A47K 3/16</b>	(2006.01)
<b>A47K 3/28</b>	(2006.01)
<b>A47K 3/40</b>	(2006.01)

#### (52) U.S. Cl.

CPC . **A47K 3/283** (2013.01); **A47K 3/40** (2013.01);  
**Y10T 29/49716** (2015.01); **Y10T 29/49826**  
(2015.01)

#### (58) Field of Classification Search

CPC ..... **A47K 3/16**; **A47K 3/04**  
USPC ..... **52/35, 36.4, 36.5; 4/578, 663, 613**  
See application file for complete search history.

#### (56) References Cited

##### U.S. PATENT DOCUMENTS

845,526 A	2/1907	Collins
1,017,167 A	2/1912	Pleins

#### OTHER PUBLICATIONS

U.S. Patent and Trademark Office; Office Action dated Mar. 4, 2011,  
as entered in co-pending or related U.S. Appl. No. 11/724,873 (12  
pages).

Amendment and Response dated Sep. 6, 2011, as filed in co-pending  
or related U.S. Appl. No. 11/724,873 (21 pages).

U.S. Patent and Trademark Office; Office Action dated Apr. 27, 2011,  
as entered in co-pending or related U.S. Appl. No. 11/724,913 (14  
pages).

(Continued)

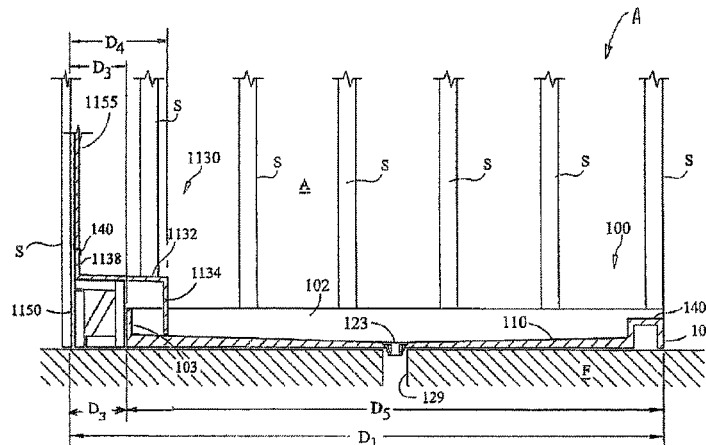
*Primary Examiner* — Basil Katcheves

(74) *Attorney, Agent, or Firm* — Kevin P. Crosby;  
GrayRobinson, P.A.

#### (57) ABSTRACT

Methods and apparatus for creating a shower or bath en-  
closure, in which, given a predetermined area in which to create  
the shower or bath, a given prefabricated water proof bath or  
shower floor module is too small to occupy the entire avail-  
able enclosure space. The apparatus includes the use of one or  
more additional enclosure components, such as one or more  
shower benches, to occupy a space between an edge or edges  
of the floor module and the exterior boundary(ies) of the  
enclosure space.

**16 Claims, 35 Drawing Sheets**



## References Cited

6,571,406	B2	6/2003	Gerloff
D480,455	S	10/2003	Painter et al.
6,643,863	B1	11/2003	Gerber
6,687,925	B2	2/2004	Minnick
6,698,037	B2	3/2004	Lippe
6,725,470	B2	4/2004	Webb
6,735,793	B2	5/2004	Peterson
6,766,544	B1	7/2004	Lloyd et al.
D495,787	S	9/2004	Helmetisie et al.
6,851,133	B1	2/2005	Nehring
6,990,695	B2	1/2006	Grayson
7,007,315	B2	3/2006	Stonecipher
7,028,349	B2	4/2006	Helmetisie et al.
7,100,331	B2	9/2006	Nehring
7,213,274	B2	5/2007	Cotton et al.
7,296,309	B2	11/2007	Nehring
7,624,759	B1	12/2009	Ismert et al.
7,739,757	B2	6/2010	Witt
8,112,831	B2	2/2012	Cook
8,141,182	B2	3/2012	Cook
8,141,183	B2	3/2012	Cook
8,181,286	B2	5/2012	Cook
8,209,795	B2	7/2012	Cook
8,307,582	B2	11/2012	Cook
8,375,480	B2	2/2013	Cook
01/0052148	A1	12/2001	Hasenkopf
02/0066140	A1	6/2002	Gerloff
03/0033668	A1	2/2003	Pane
03/0089059	A1	5/2003	Kirby
04/0034922	A1	2/2004	Grayson
04/0237187	A1	12/2004	Stonecipher
05/0050628	A1	3/2005	Mascheroni
05/0081290	A1	4/2005	Stimpson
05/0210577	A1	9/2005	Sisk
05/0283900	A1	12/2005	Campbell
06/0026752	A1	2/2006	Torres
06/0213006	A1	9/2006	Rush, Jr. et al.
07/0266491	A1	11/2007	Gann
08/0148474	A1	6/2008	Witt
08/0222790	A1	9/2008	Grant
08/0222793	A1	9/2008	Cook
08/0222794	A1	9/2008	Cook
08/0222795	A1	9/2008	Cook
08/0222796	A1	9/2008	Cook
08/0222797	A1	9/2008	Cook
08/0222891	A1	9/2008	Cook
08/0229494	A1	9/2008	DeGooye et al.
09/0241258	A1	10/2009	Cook
10/0024107	A1	2/2010	Stimpson
10/0043136	A1	2/2010	Michael
10/0263188	A1	10/2010	Cook
10/0281612	A1	11/2010	Cook
10/0325969	A1	12/2010	Hourihan
11/0197351	A1	8/2011	Cook
12/0036629	A1	2/2012	Cook
12/0036630	A1	2/2012	Cook
12/0036631	A1	2/2012	Cook
12/0036632	A1	2/2012	Cook
12/0036697	A1	2/2012	Cook
12/078989	A1	11/2012	Cook

## FOREIGN PATENT DOCUMENTS

GB	2093342	A	9/1982
GB	2108382	A	5/1983
GB	2270836	A	3/1994
GB	2271713	A	4/1994
JP	53036570		4/1978
JP	54038649	A	3/1979
JP	5017981	A	1/1993
JP	5017982	A	1/1993
JP	8128218	A	5/1996
JP	2000265513	A	9/2000
JP	2000514894	A	11/2000
JP	2005187138	A	7/2005
JP	2007315072	A	12/2007
KR	101996002341	B1	2/1996
KR	200191082	Y1	8/2000
KR	200206787	Y1	12/2000

(56)

**References Cited**

## FOREIGN PATENT DOCUMENTS

KR	20010078654	A	8/2001
KR	20060009528	A	2/2006
KR	100865483	B1	10/2008
WO	9851202	A1	11/1998
WO	2007033949	A1	3/2007
WO	2008088457	A1	7/2008
WO	2008115467	A2	9/2008
WO	2010129043	A2	11/2010
WO	2010132090	A1	11/2010
WO	2011103294	A2	8/2011
WO	2011103312	A2	8/2011
WO	2012021601	A2	2/2012
WO	2012021606	A2	2/2012
WO	2012021616	A2	2/2012
WO	2012021618	A2	2/2012
WO	2012021623	A2	2/2012

## OTHER PUBLICATIONS

Amendment and Response dated Sep. 27, 2011, as filed in co-pending or related U.S. Appl. No. 11/724,913 (11 pages).  
 Notice of Allowability dated Dec. 9, 2011, as filed in co-pending or related U.S. Appl. No. 11/724,913 (3 pages).  
 Notice of Allowability dated Sep. 15, 2011, as filed in co-pending or related U.S. Appl. No. 12/463,803 (4 pages).  
 Amendment After Allowance dated Dec. 14, 2011, as filed in co-pending or related U.S. Appl. No. 12/463,803 (3 pages).  
 U.S. Patent and Trademark Office; Office Action dated Oct. 4, 2011, as entered in co-pending or related U.S. Appl. No. 12/435,959 (12 pages).  
 Amendment and Response dated Apr. 4, 2012, as filed in co-pending or related U.S. Appl. No. 12/435,959 (8 pages).  
 U.S. Patent and Trademark Office; Office Action dated Jun. 17, 2011, as entered in co-pending or related U.S. Appl. No. 11/725,113 (13 pages).  
 Amendment and Response dated Dec. 14, 2011, as filed in co-pending or related U.S. Appl. No. 11/725,113 (21 pages).  
 Notice of Allowability dated Mar. 1, 2012, as filed in co-pending or related U.S. Appl. No. 11/725,113 (2 pages).  
 International Search Report and Written Opinion dated Apr. 23, 2012 issued by the Korean Intellectual Property Office as International Searching Authority in connection with International Application No. PCT/US2011/047246 (10 pages).  
 International Search Report and Written Opinion dated Apr. 16, 2012 issued by the Korean Intellectual Property Office as International Searching Authority in connection with International Application No. PCT/US2011/047250 (7 pages).  
 International Search Report and Written Opinion dated Apr. 24, 2012 issued by the Korean Intellectual Property Office as International Searching Authority in connection with International Application No. PCT/US2011/047226 (8 pages).  
 International Search Report and Written Opinion dated Apr. 24, 2012 issued by the Korean Intellectual Property Office as International Searching Authority in connection with International Application No. PCT/US2011/047236 (6 pages).  
 International Search Report and Written Opinion dated May 2, 2012 issued by the Korean Intellectual Property Office as International Searching Authority in connection with International Application No. PCT/US2011/047255 (20 pages).  
 Amendment and Response dated Apr. 24, 2012, as filed in co-pending or related U.S. Appl. No. 12/706,792 (7 pages).  
 Notice of Allowability dated Jul. 11, 2012, as entered in co-pending or related U.S. Appl. No. 12/706,792 (3 pages).  
 U.S. Patent and Trademark Office; Final Office Action dated Jun. 12, 2012, as entered in co-pending or related U.S. Appl. No. 12/435,959 (11 pages).  
 Amendment and Response dated Aug. 2, 2012, as filed in co-pending or related U.S. Appl. No. 11/725,112 (9 pages).  
 Amendment and Response dated Sep. 12, 2012, as filed in co-pending or related U.S. Appl. No. 12/435,959 (8 pages).

U.S. Patent and Trademark Office; Office Action dated Sep. 13, 2012, as entered in co-pending or related U.S. Appl. No. 12/853,612 (10 pages).  
 U.S. Patent and Trademark Office; Office Action dated Oct. 2, 2012, as entered in co-pending or related U.S. Appl. No. 12/853,639 (11 pages).  
 U.S. Patent and Trademark Office; Final Office Action dated Dec. 20, 2012, as entered in co-pending or related U.S. Appl. No. 12/435,959 (6 pages).  
 U.S. Patent and Trademark Office; Final Office Action dated Jan. 14, 2013, as entered in co-pending or related U.S. Appl. No. 12/853,733 (16 pages).  
 Notice of Allowability dated Nov. 26, 2012, as entered in co-pending or related U.S. Appl. No. 11/725,112 (3 pages).  
 T. Clear Corporation; Finpan Concrete Backer Board; Preformed Bathroom Components; <http://finpan.com-utilacrete-performed.html>; Sep. 20, 2006; 3 pages.  
 Custom size Corian and Acrylic shower bases and shower surrounds made to any size, shape, and drain; 1 page; KBRs Manufacturing, Inc., The Perfect Fit; <http://showerbase.com>; Sep. 20, 2006.  
 Bonsai American—Tile Products; [http://www.bonsai.com/fileproducts\\_view.html?id=Qq46YHV5eng%3D](http://www.bonsai.com/fileproducts_view.html?id=Qq46YHV5eng%3D); Sep. 16, 2006; 5 pages.  
 International Search Report and Written Opinion dated Oct. 21, 2008 issued by the Korean Intellectual Property Office as International Searching Authority in connection with International Application No. PCT/US08/003490 (9 pages).  
 International Search Report and Written Opinion dated Aug. 23, 2010 issued by the Korean Intellectual Property Office as International Searching Authority in connection with International Application No. PCT/US2010/001313 (4 pages).  
 International Search Report and Written Opinion dated Sep. 29, 2011 issued by the Korean Intellectual Property Office as International Searching Authority in connection with International Application No. PCT/US2011/025275 (9 pages).  
 International Search Report and Written Opinion dated Oct. 28, 2011 issued by the Korean Intellectual Property Office as International Searching Authority in connection with International Application No. PCT/US2011/025252 (9 pages).  
 International Search Report and Written Opinion dated Feb. 7, 2011 issued by the Korean Intellectual Property Office as International Searching Authority in connection with International Application No. PCT/US2010/001317 (9 pages).  
 U.S. Patent and Trademark Office; Office Action dated Apr. 27, 2011, as entered in co-pending or related U.S. Appl. No. 11/724,914 (17 pages).  
 Amendment and Response dated Sep. 27, 2011, as filed in co-pending or related U.S. Appl. No. 11/724,914 (11 pages).  
 Notice of Allowability dated Dec. 19, 2011, as entered in co-pending or related U.S. Appl. No. 11/724,914 (3 pages).  
 U.S. Patent and Trademark Office; Office Action dated Mar. 29, 2011, as entered in co-pending or related U.S. Appl. No. 12/724,912 (11 pages).  
 Amendment and Response dated Sep. 27, 2011, as filed in co-pending or related U.S. Appl. No. 11/724,912 (10 pages).  
 Notice of Allowability dated Jan. 26, 2012, as entered in co-pending or related U.S. Appl. No. 11/724,912 (1 page).  
 U.S. Patent and Trademark Office; Office Action dated Jan. 24, 2012, as entered in co-pending or related U.S. Appl. No. 12/706,792 (7 pages).  
 U.S. Patent and Trademark Office; Office Action dated Jun. 2, 2011, as entered in co-pending or related U.S. Appl. No. 11/725,112 (9 pages).  
 Amendment and Response dated Nov. 2, 2011, as filed in co-pending or related U.S. Appl. No. 11/725,112 (13 pages).  
 U.S. Patent and Trademark Office; Office Action dated Feb. 3, 2012, as entered in co-pending or related U.S. Appl. No. 11/725,112 (6 pages).

\* cited by examiner

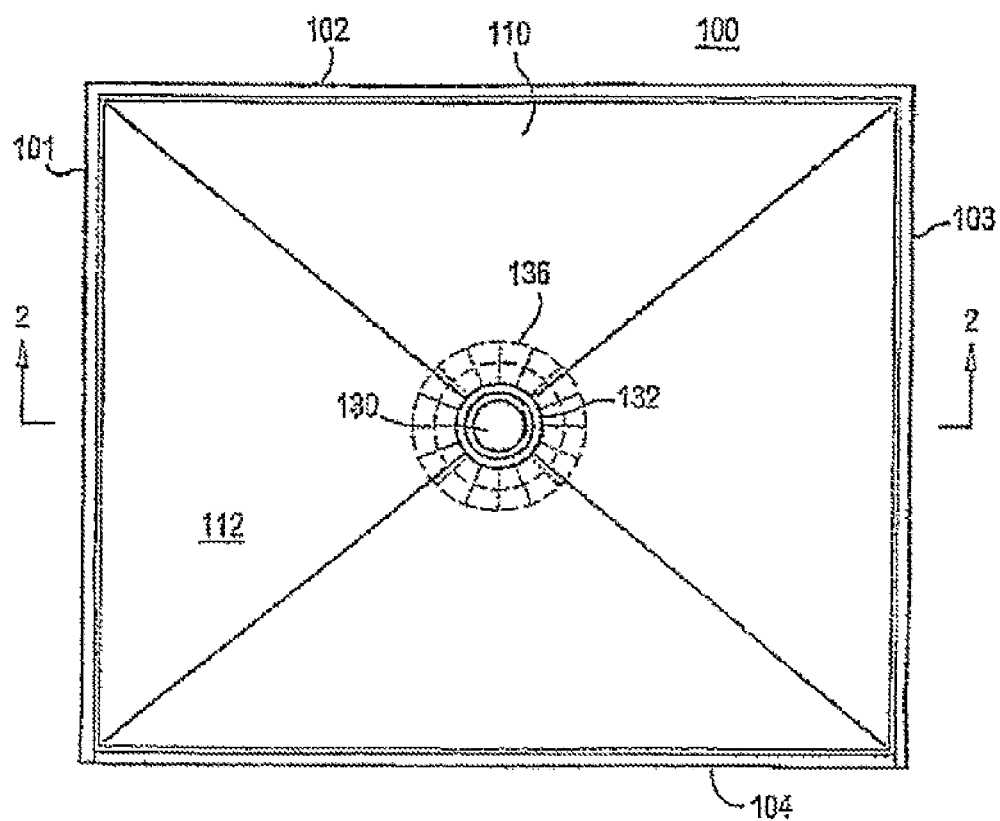


FIG. 1

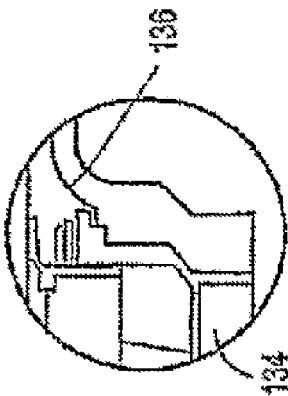
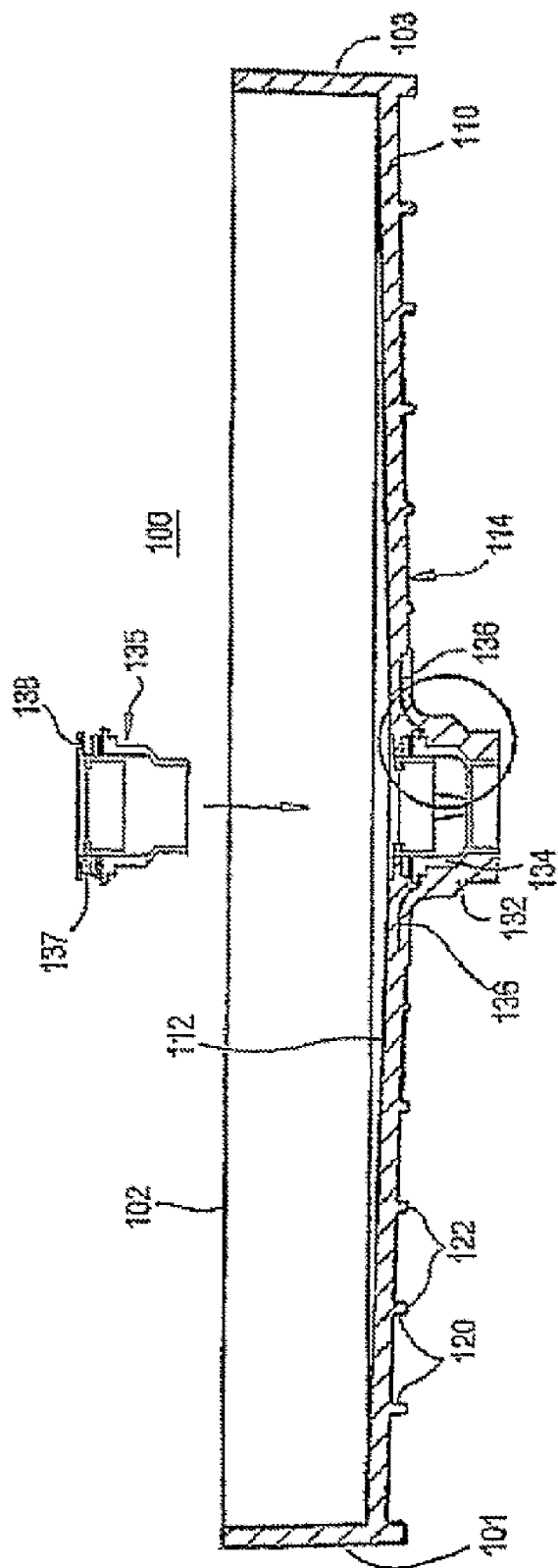
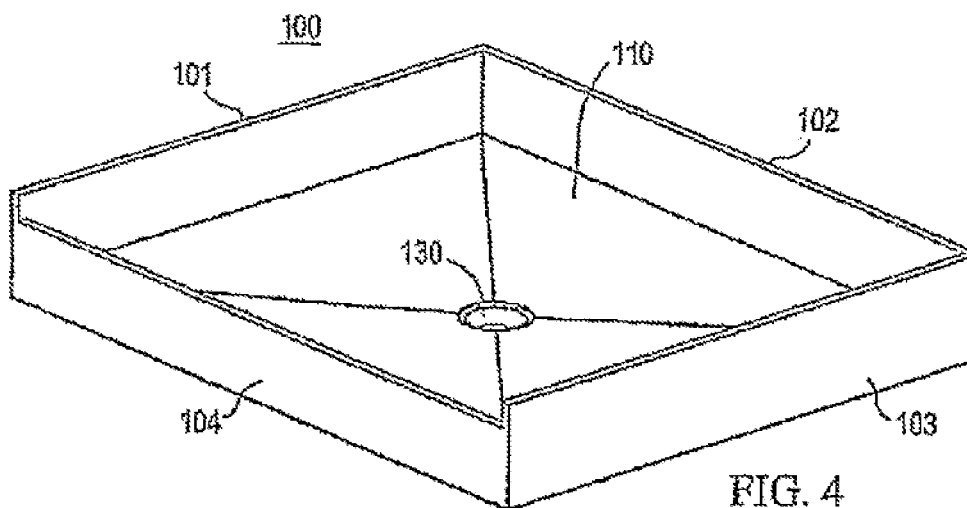
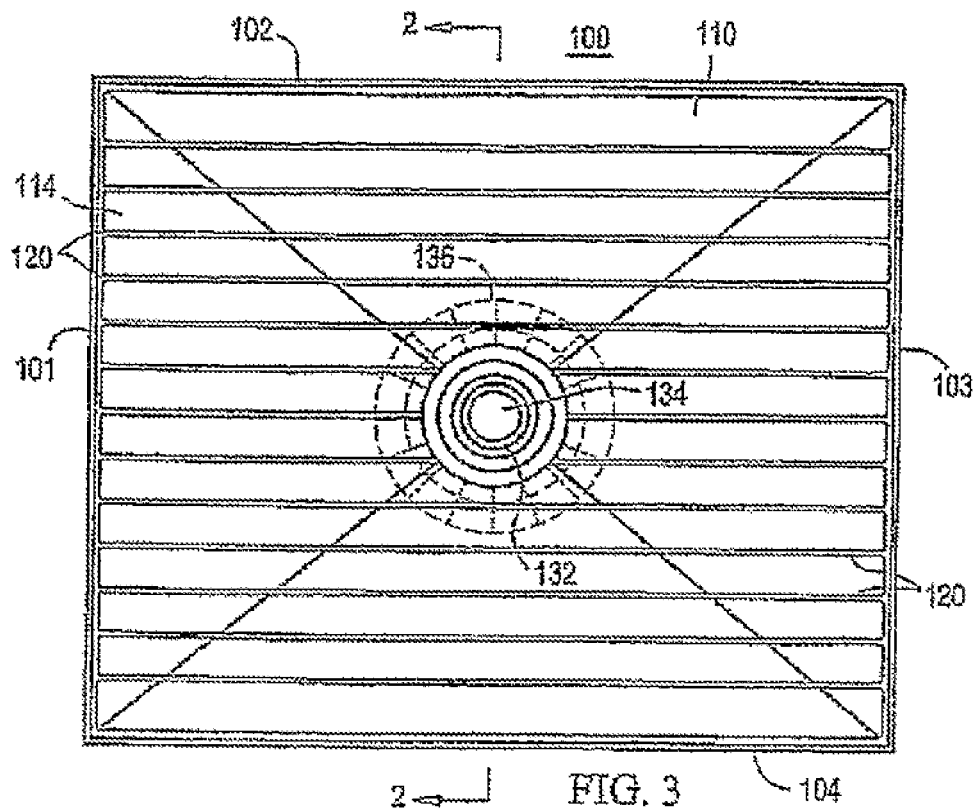


FIG. 2A

FIG. 2



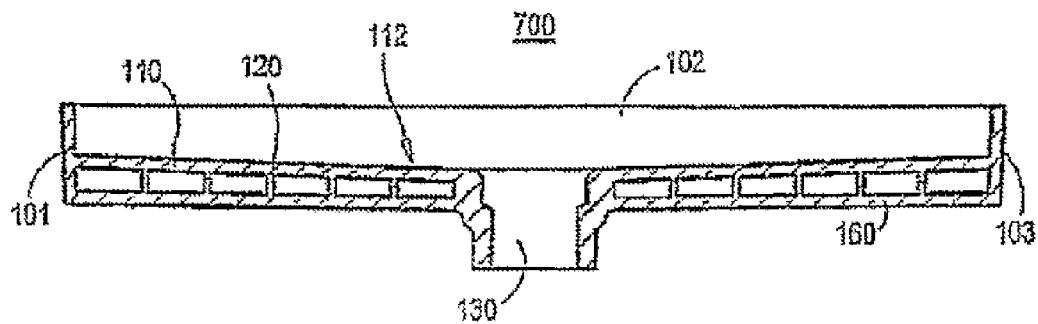


FIG. 4A

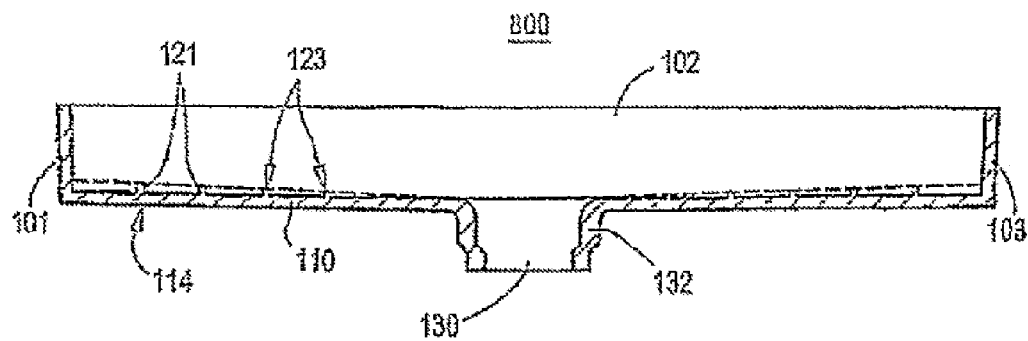


FIG. 4B

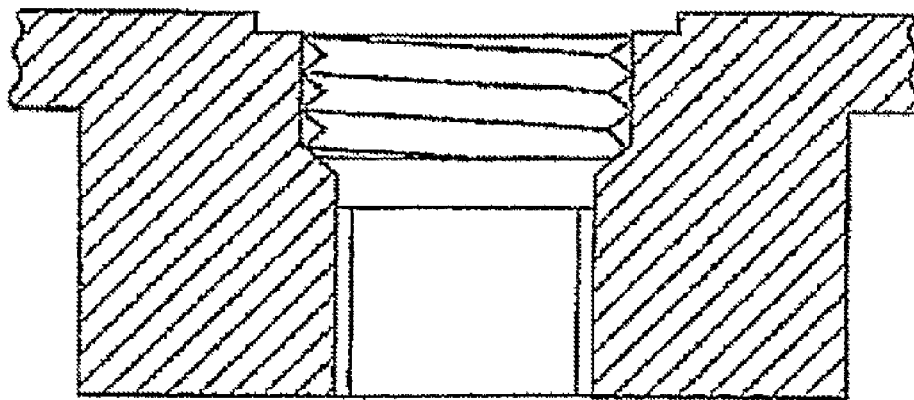


FIG. 5  
PRIOR ART

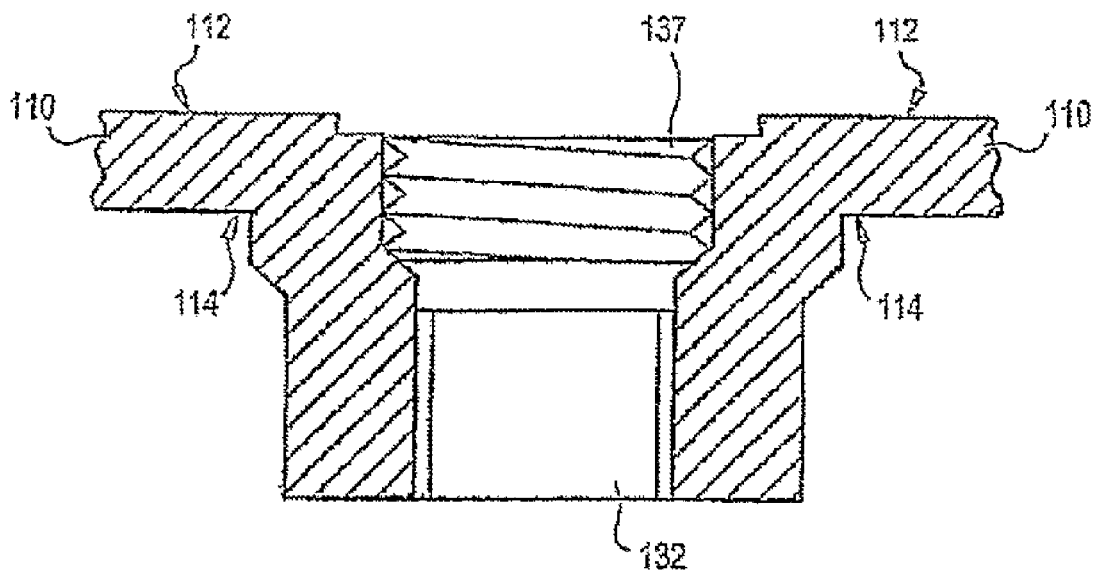


FIG. 6



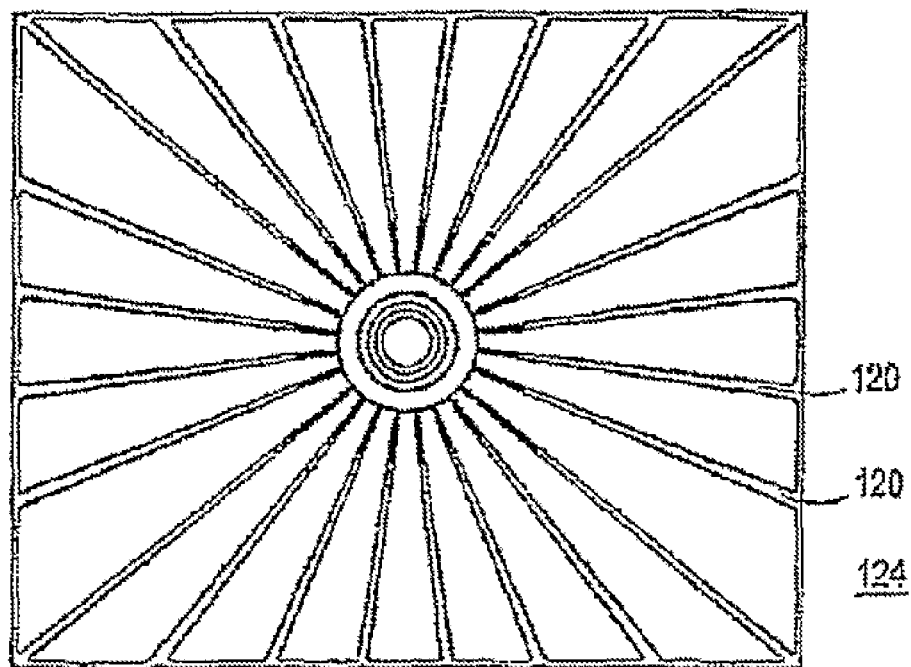


FIG. 7

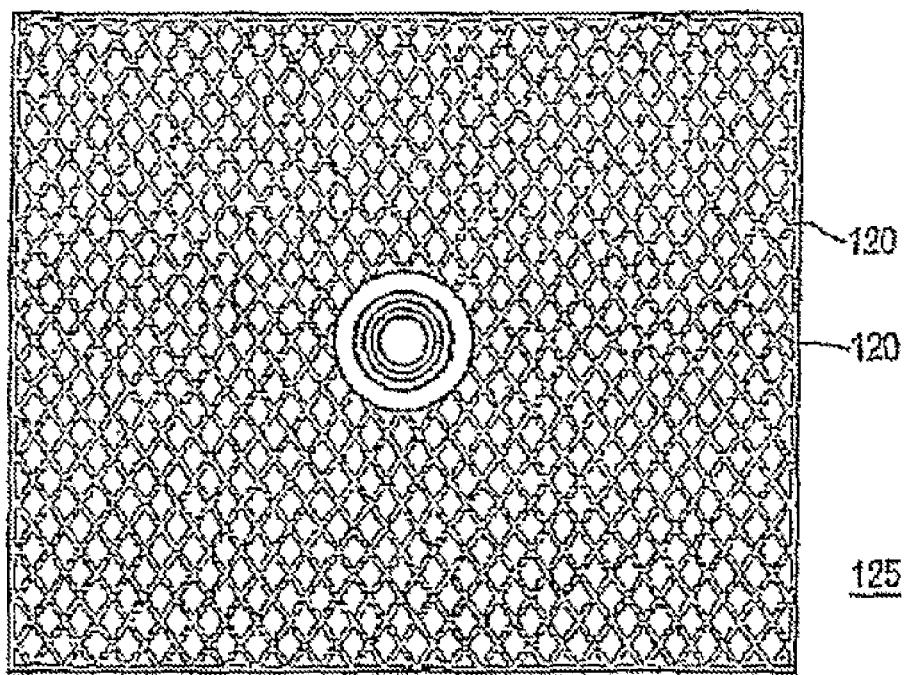


FIG. 8

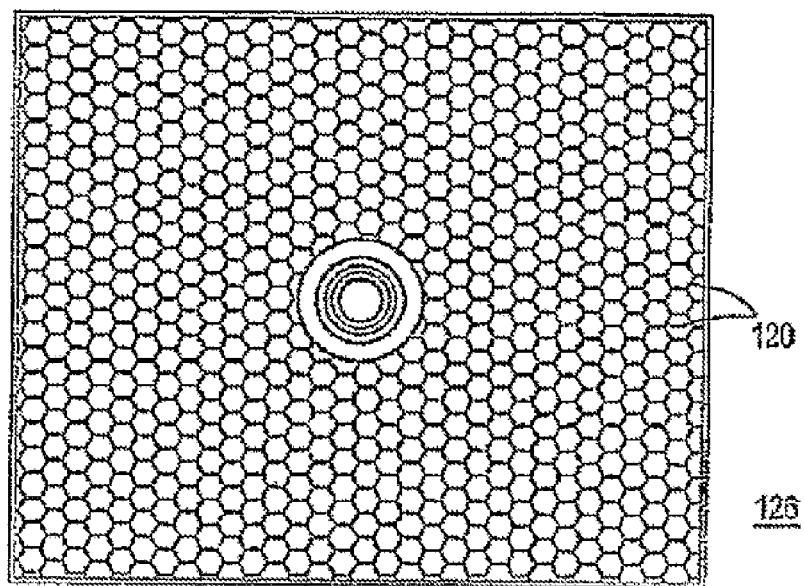


FIG. 9

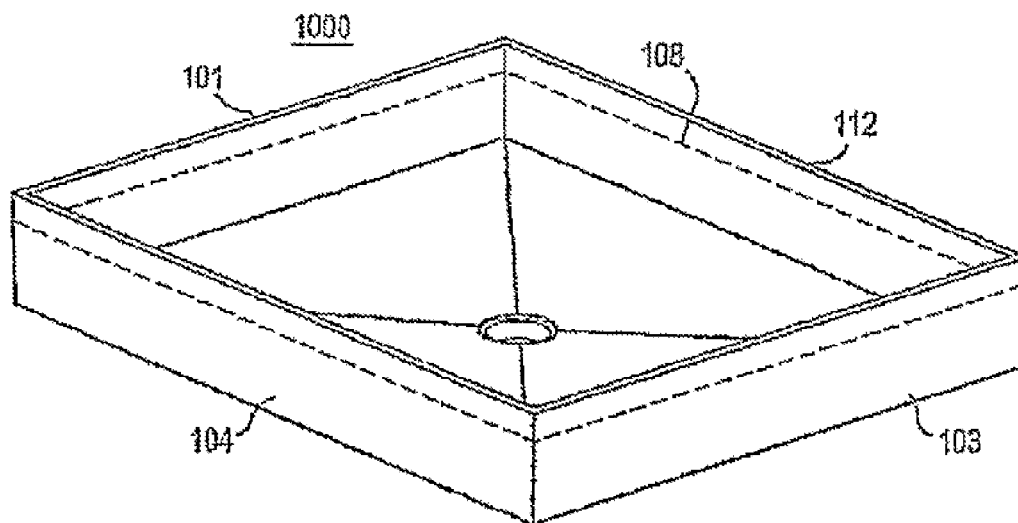


FIG. 10

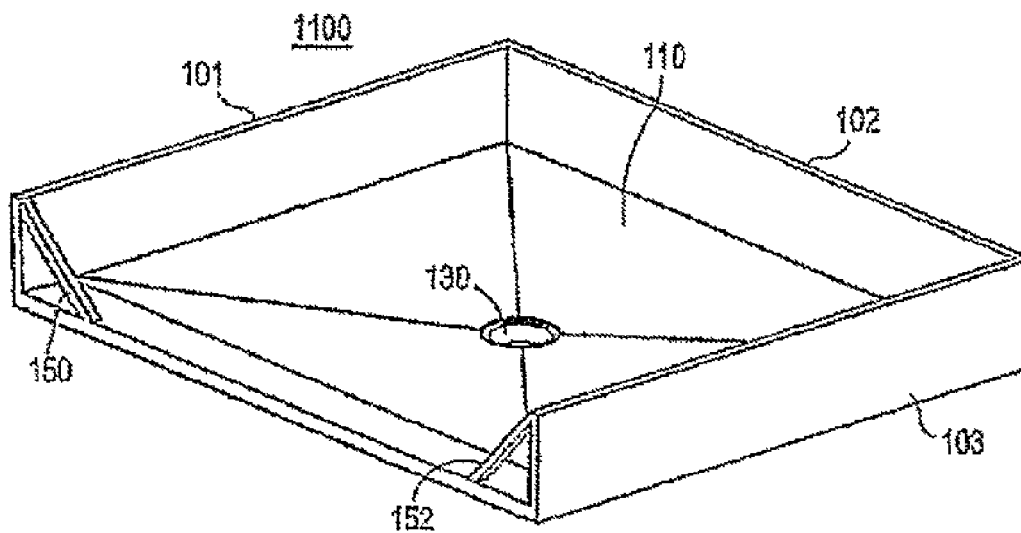


FIG. 11

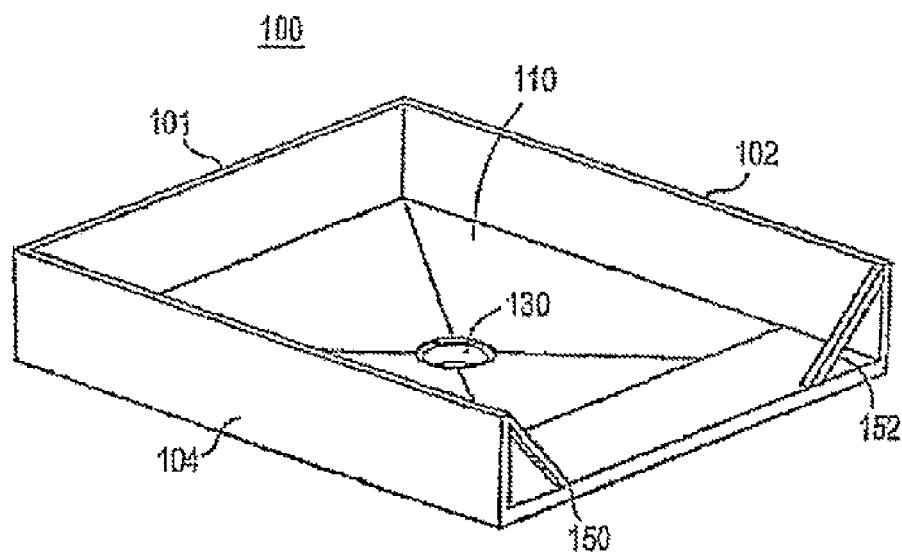


FIG. 12

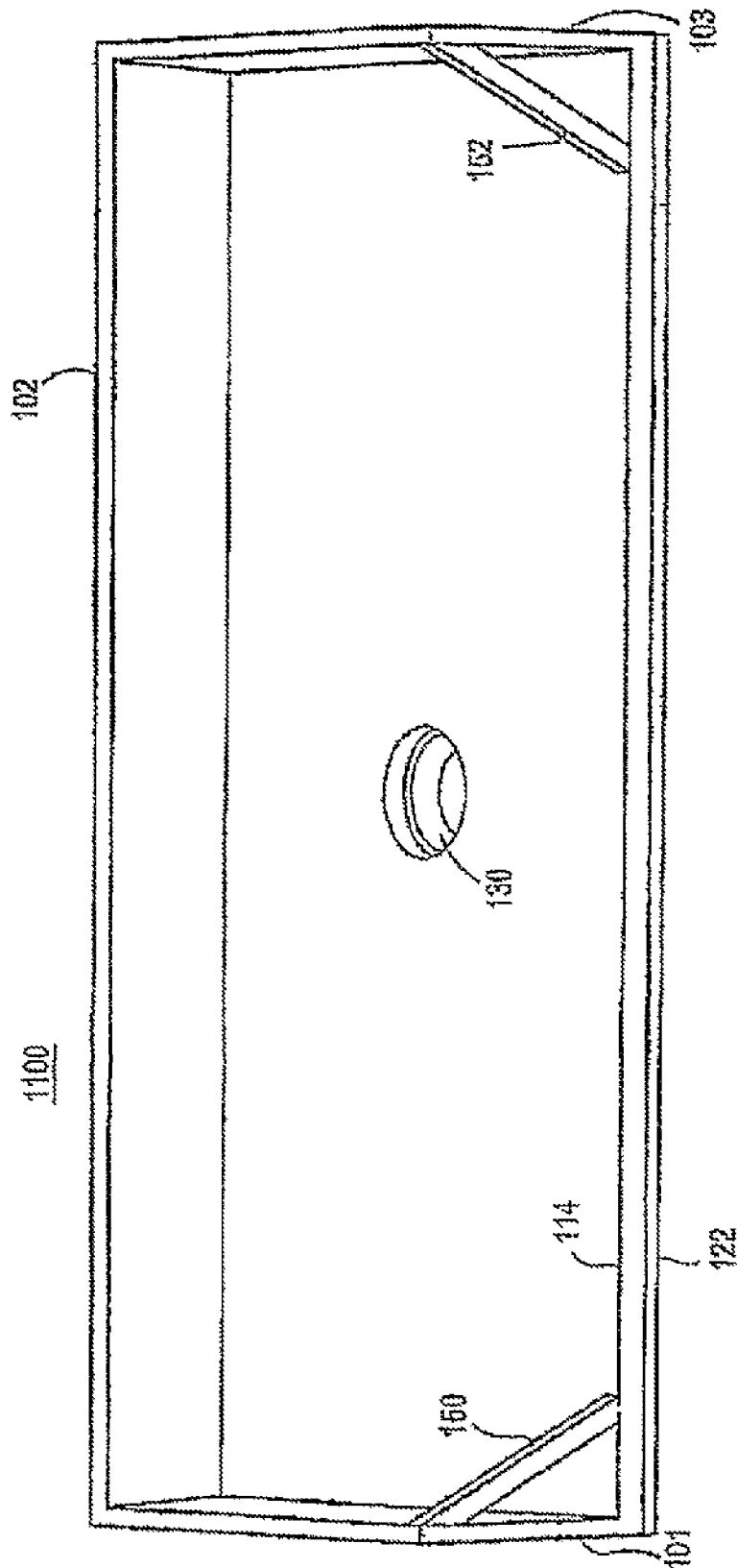


FIG. 13

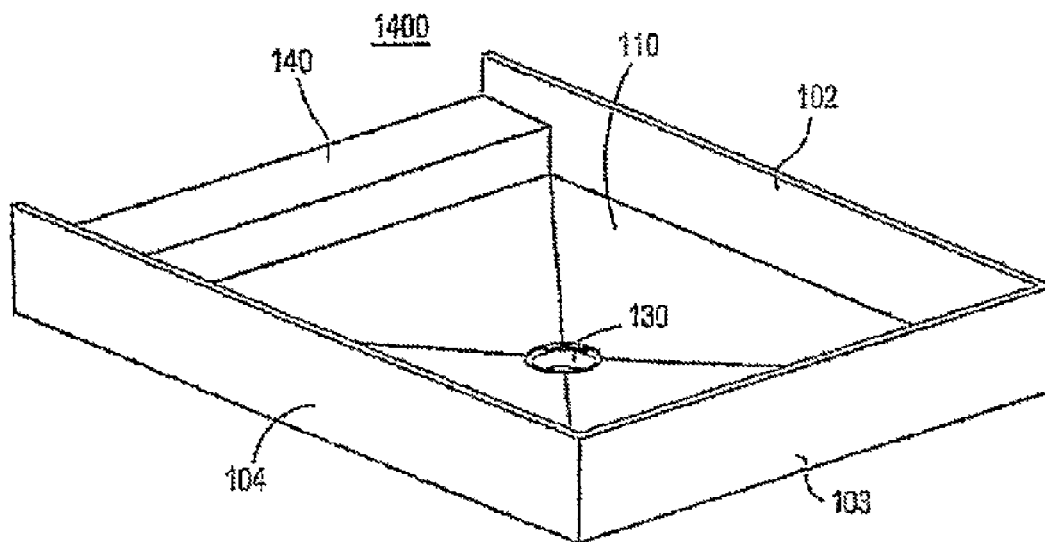


FIG. 14

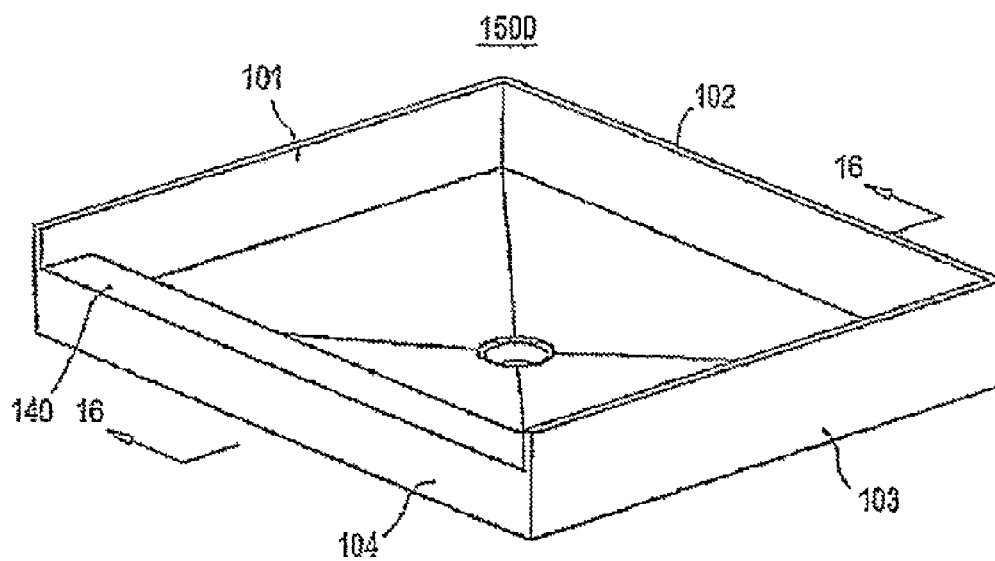


FIG. 15

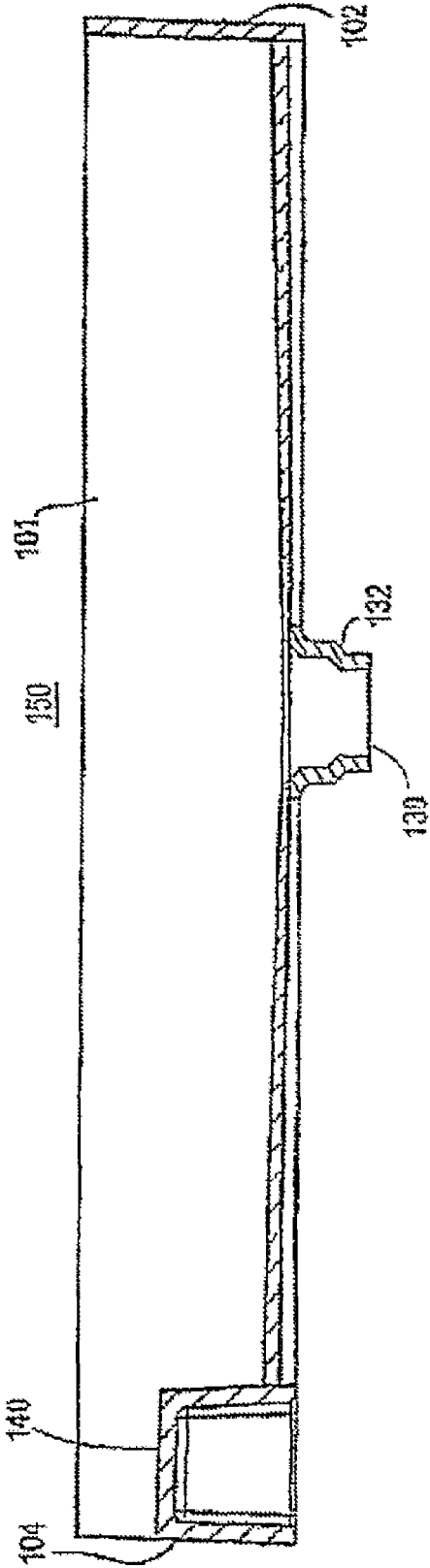


FIG. 16

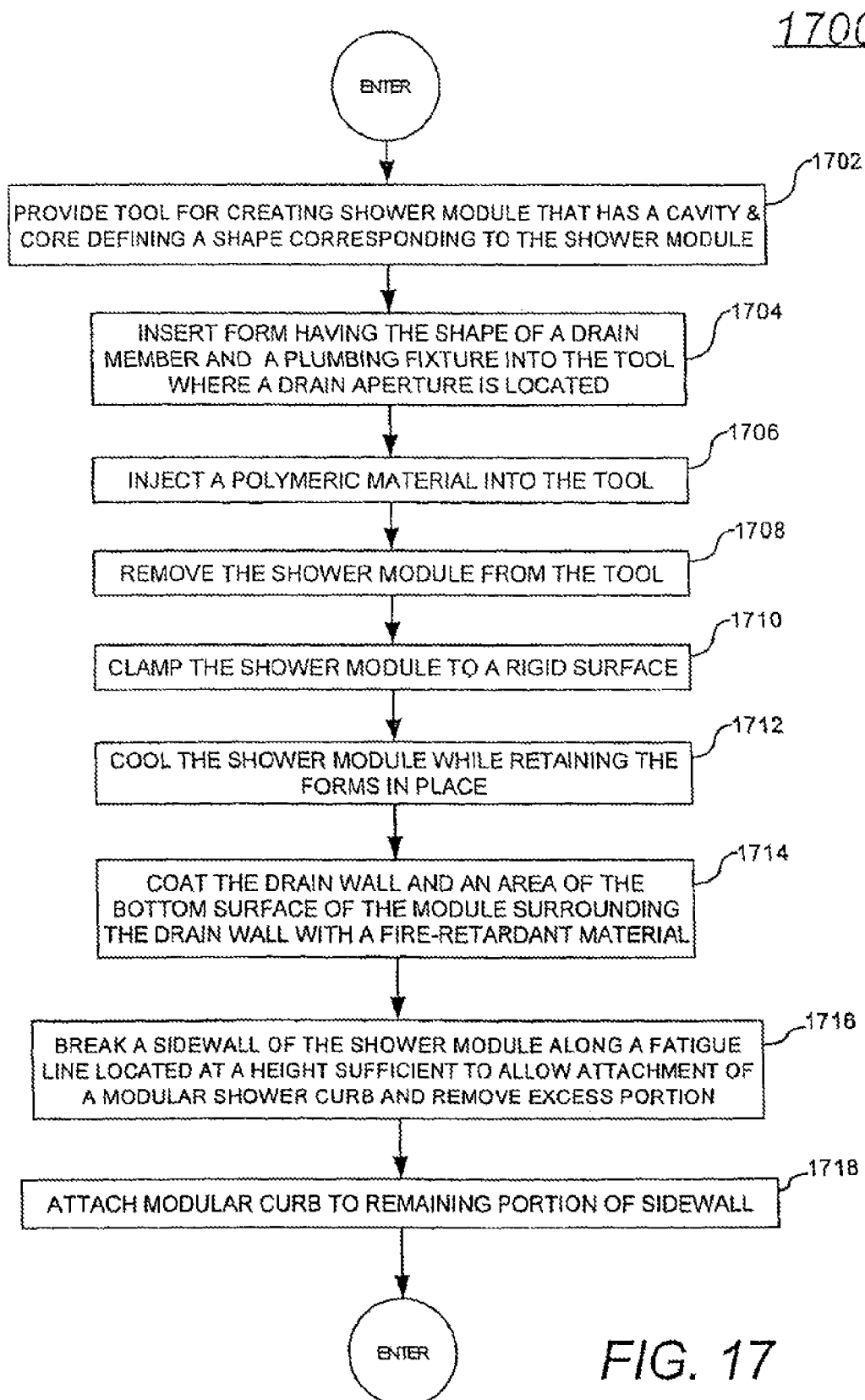


FIG. 17

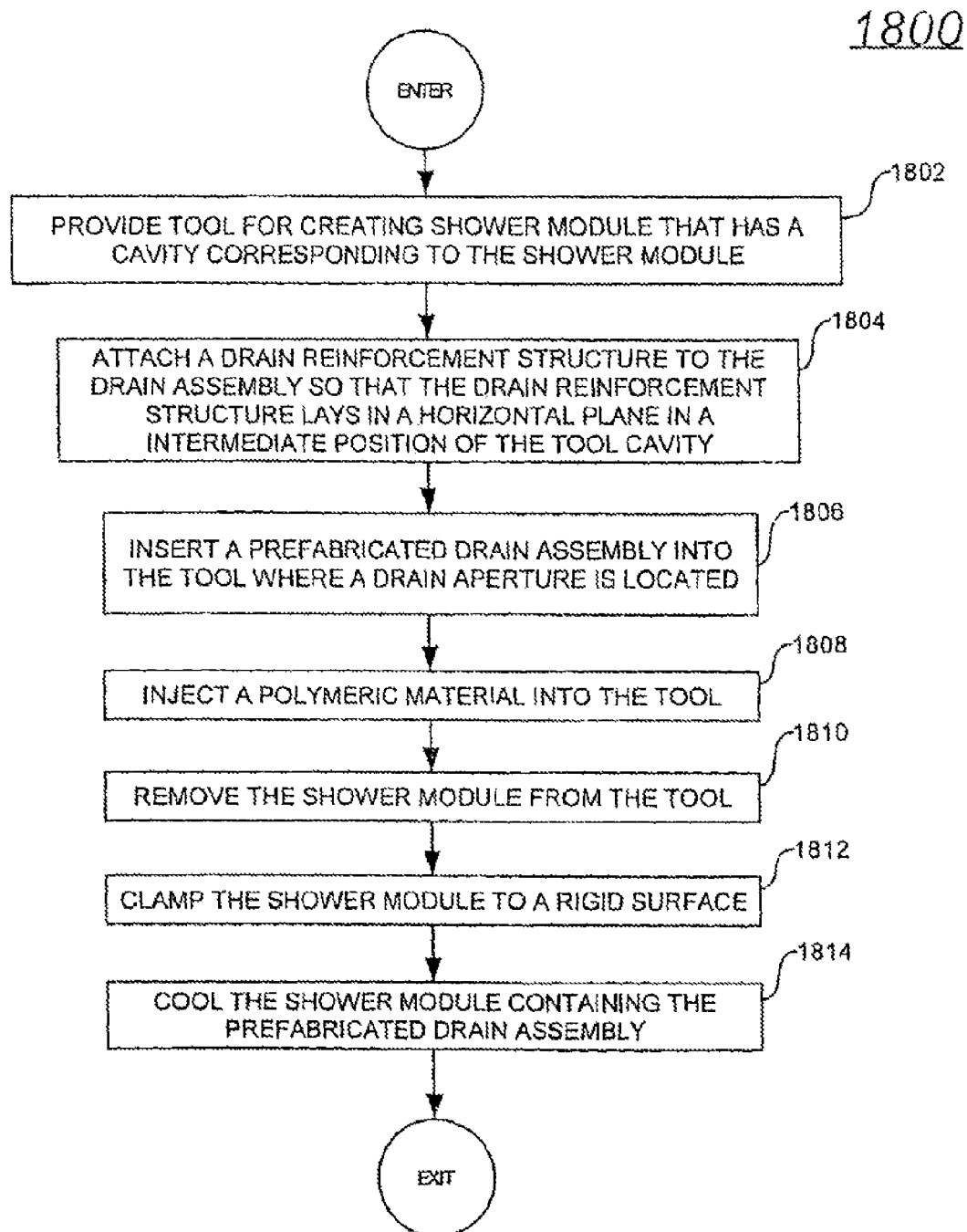
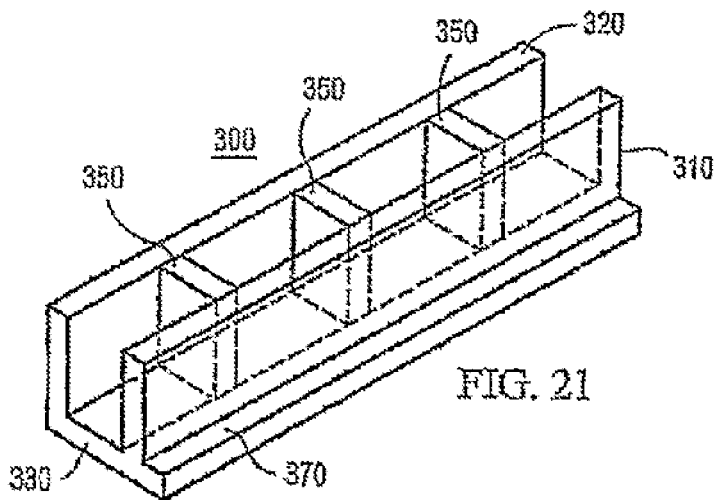
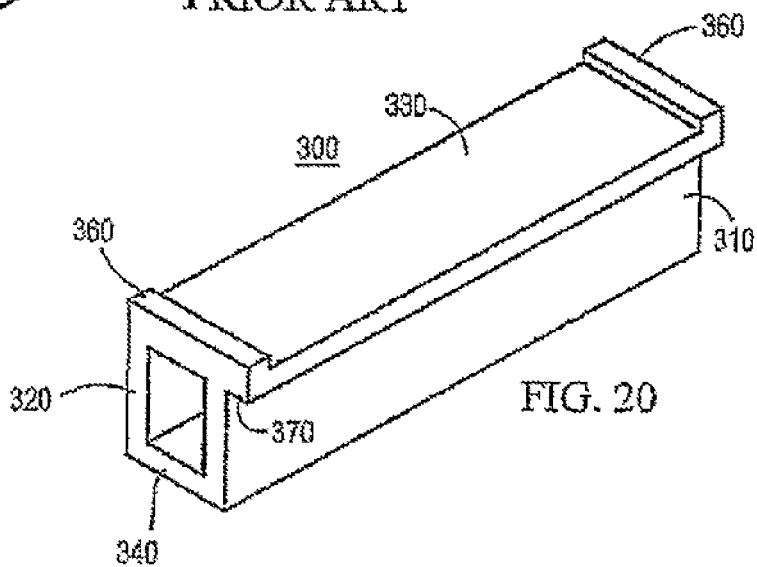
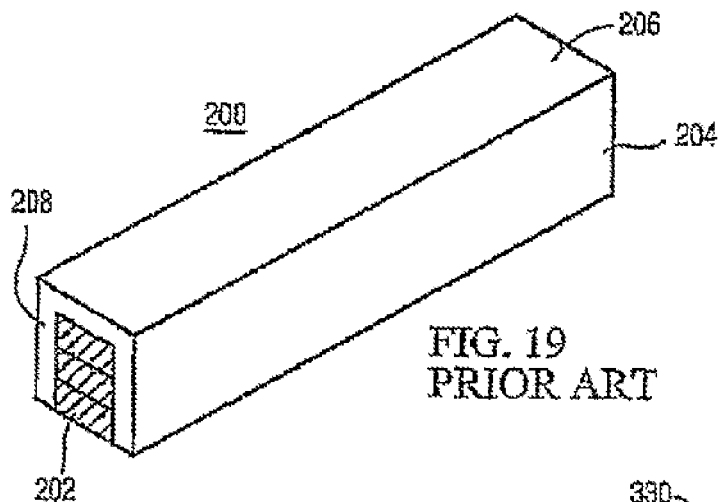
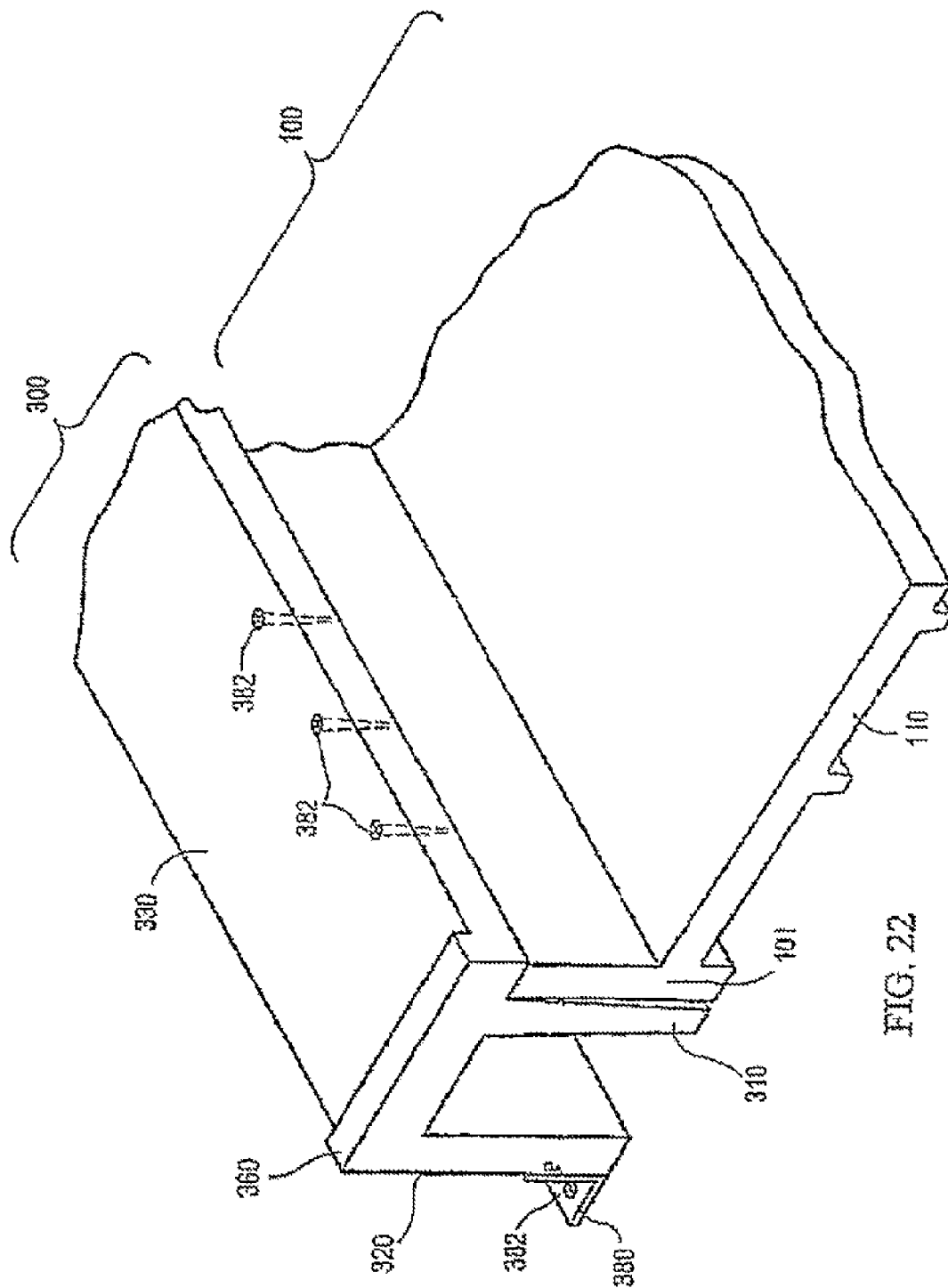
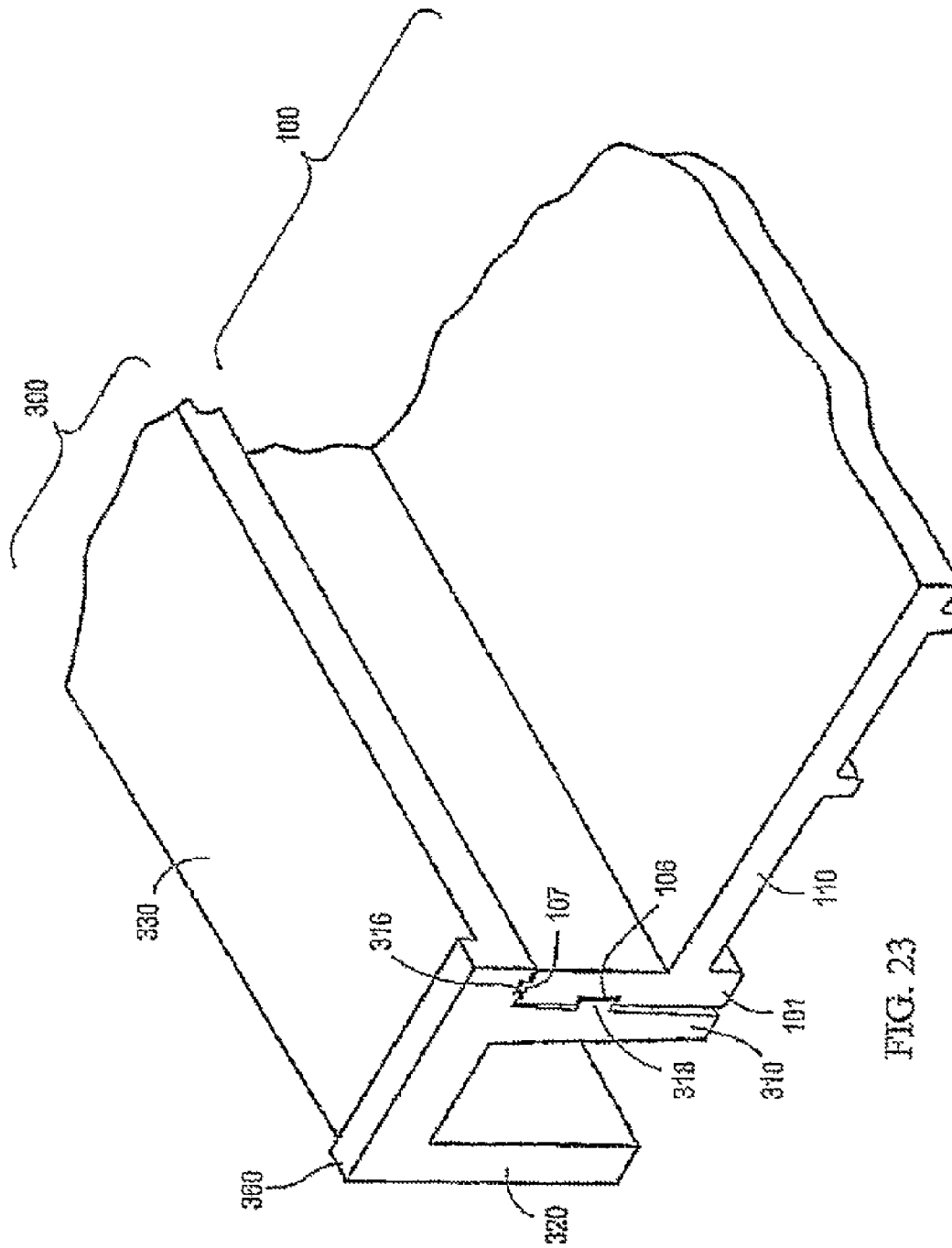


FIG. 18









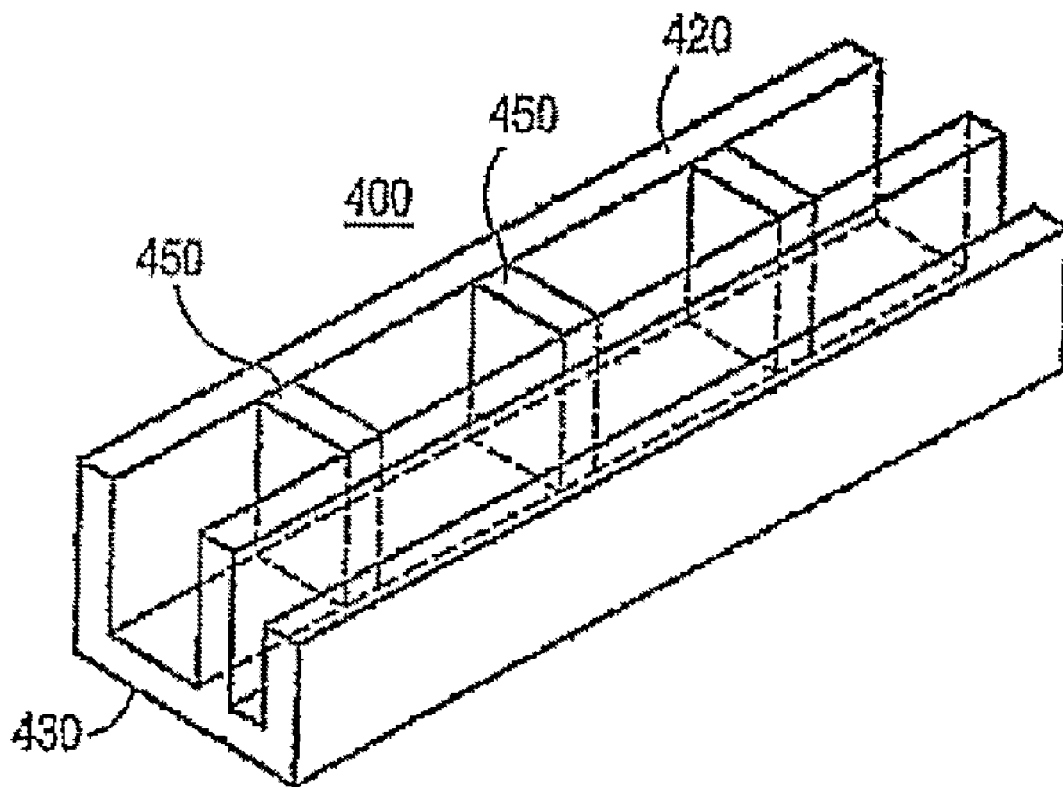
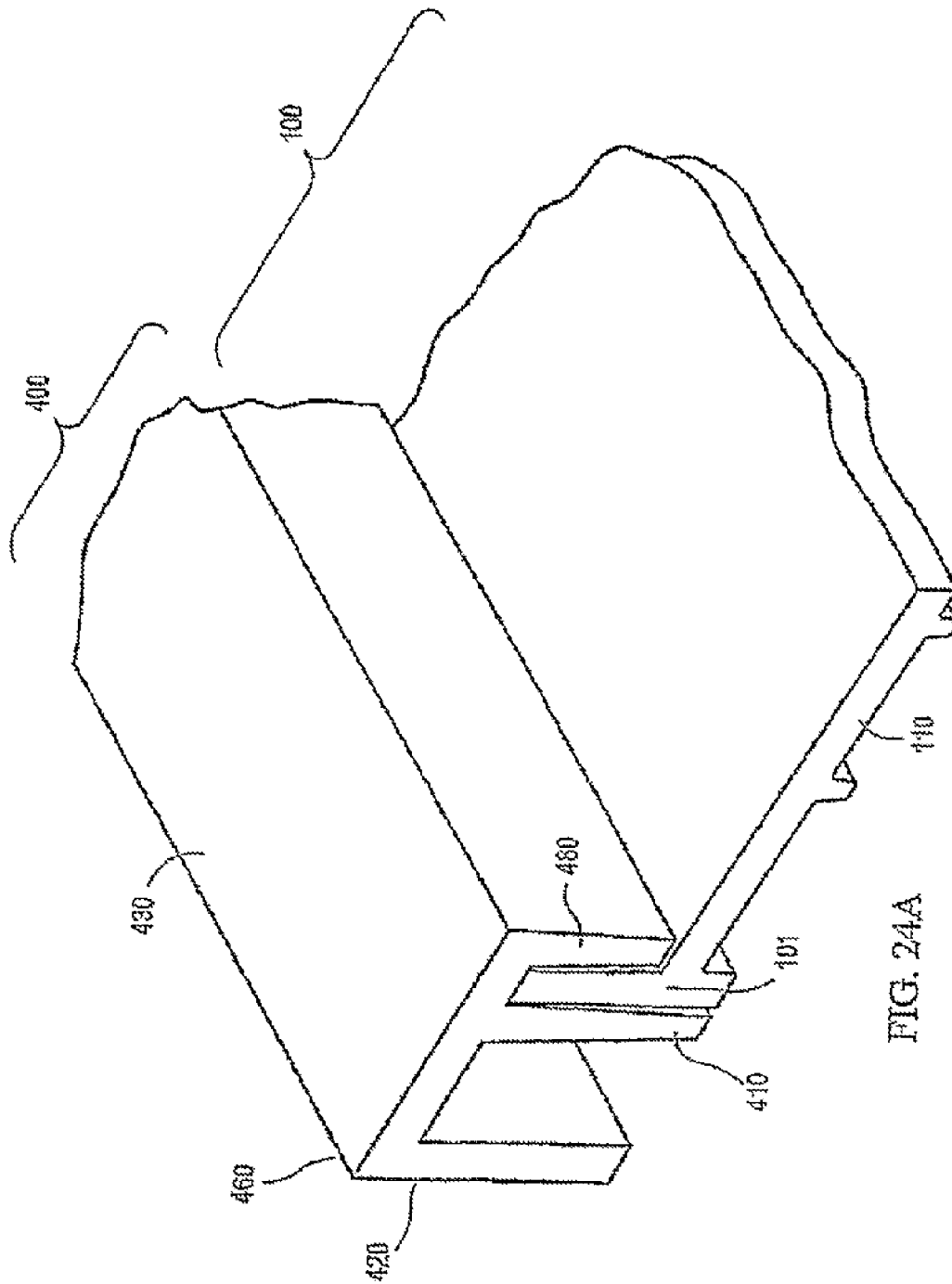


FIG. 24



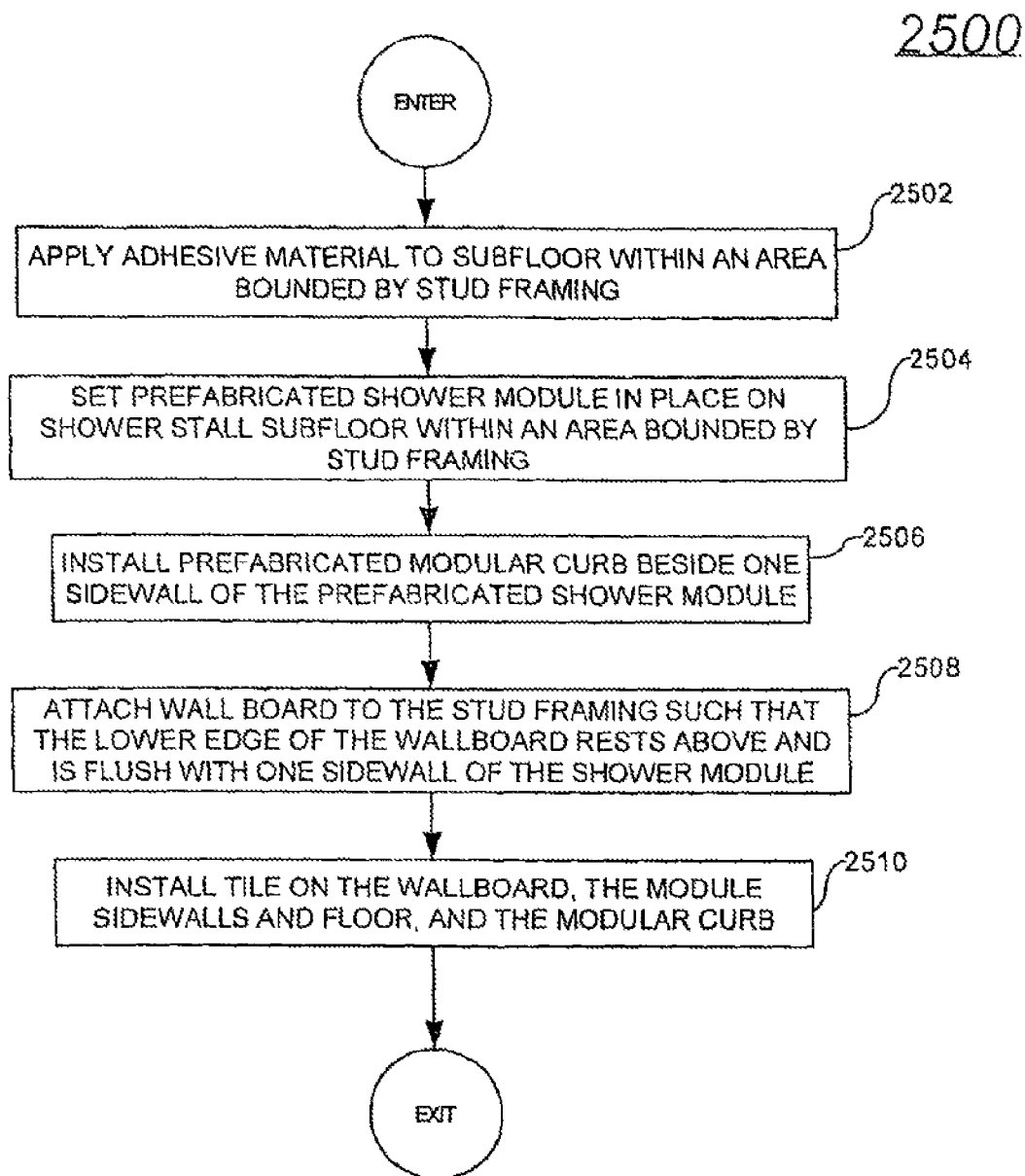
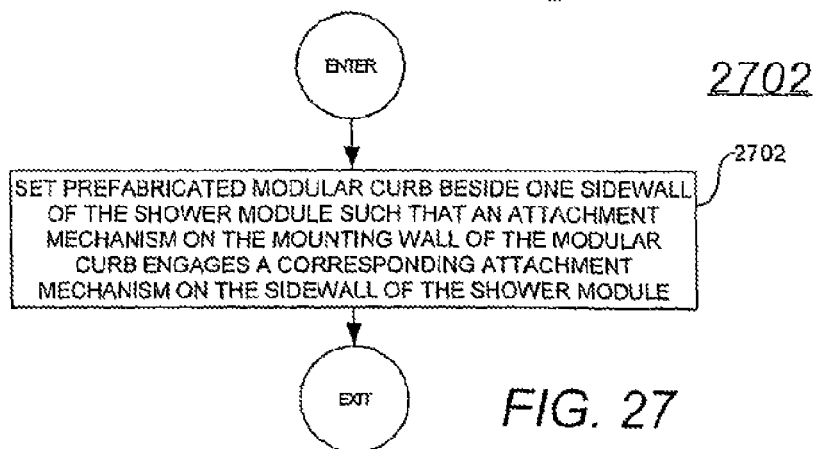
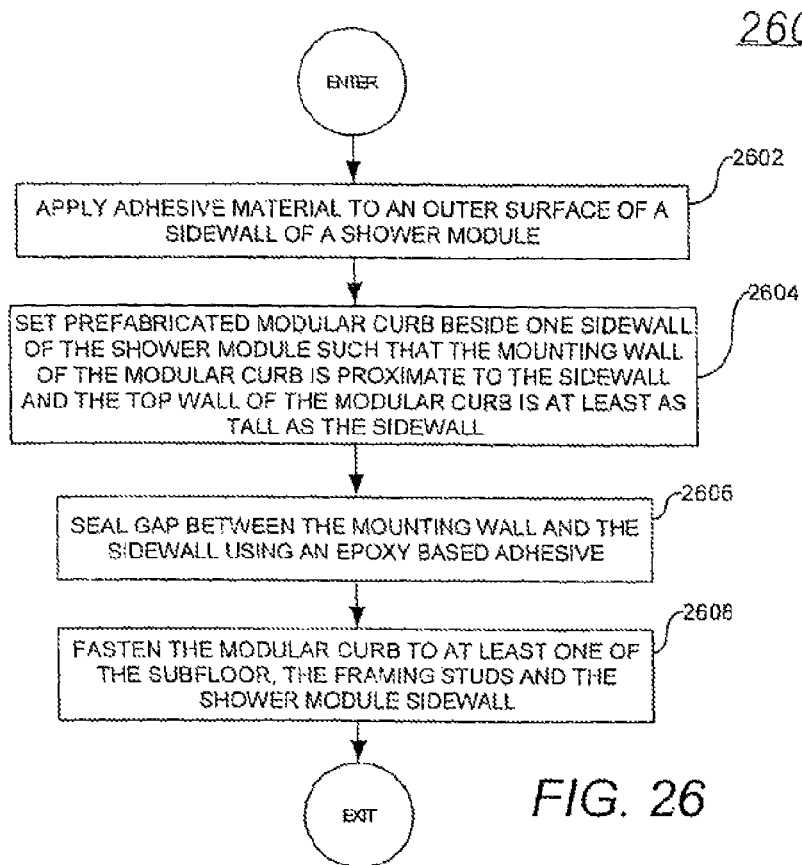


FIG. 25



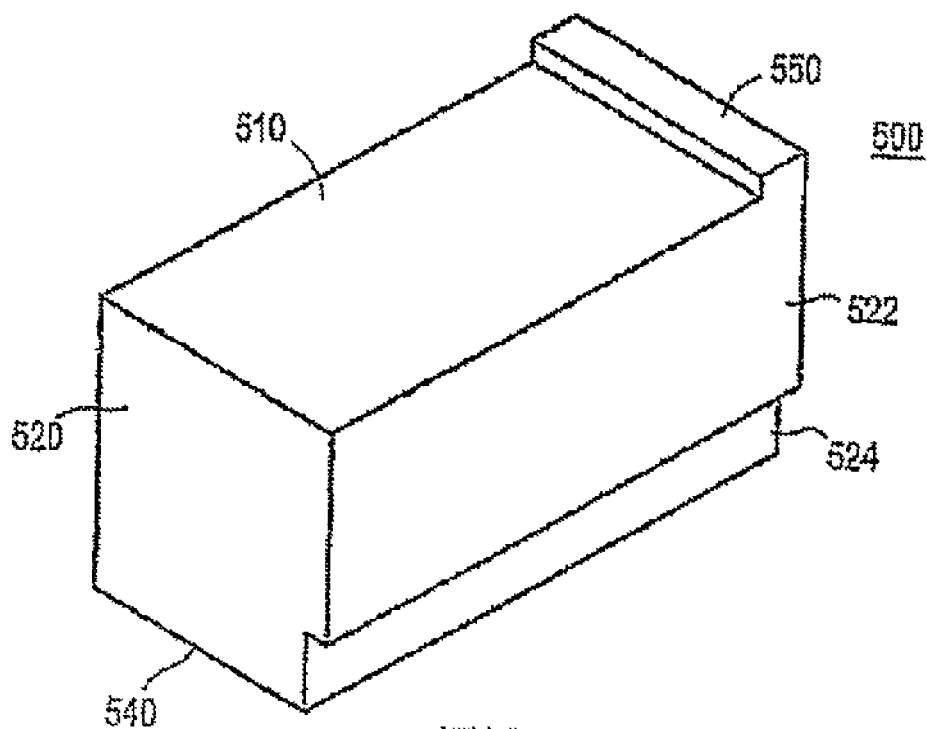


FIG. 28

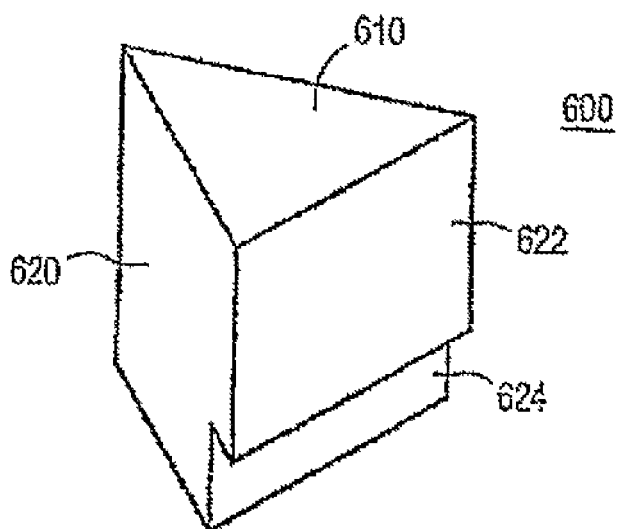


FIG. 29



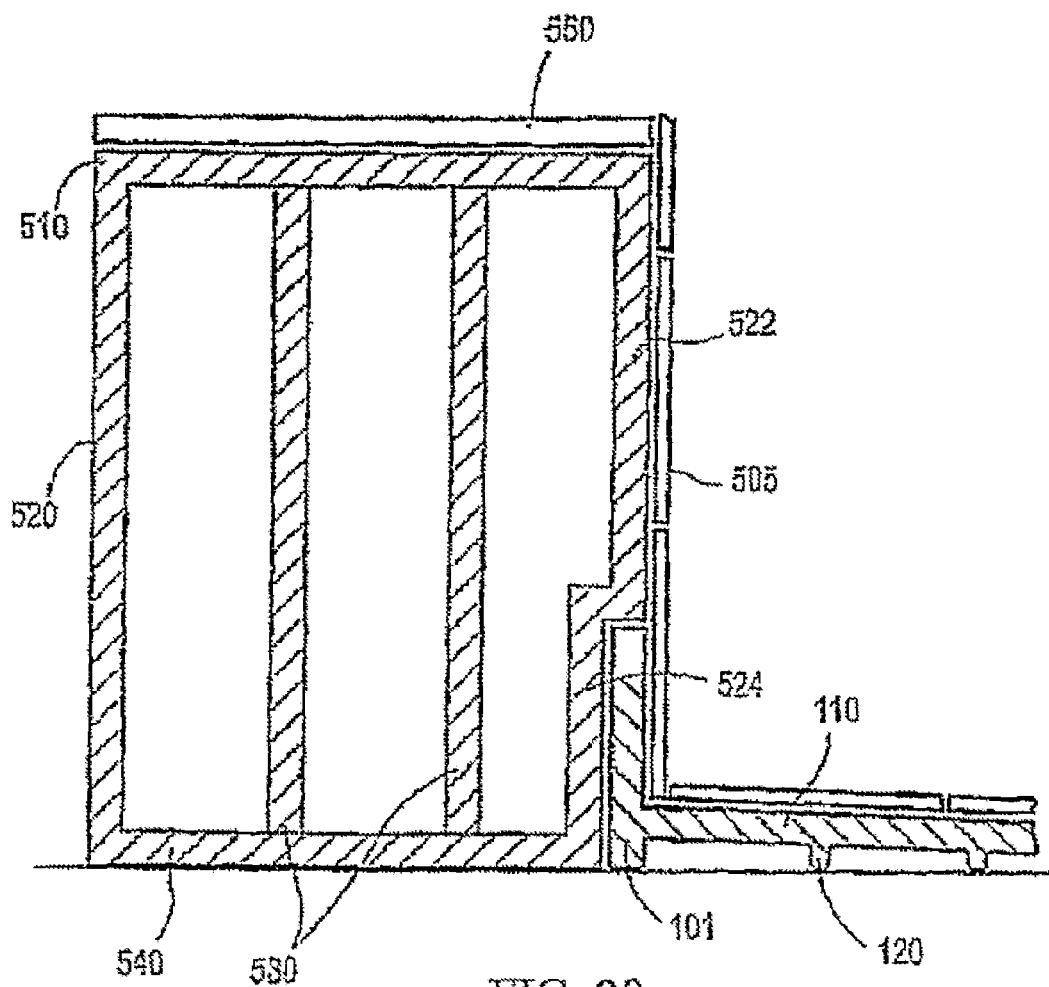


FIG. 30

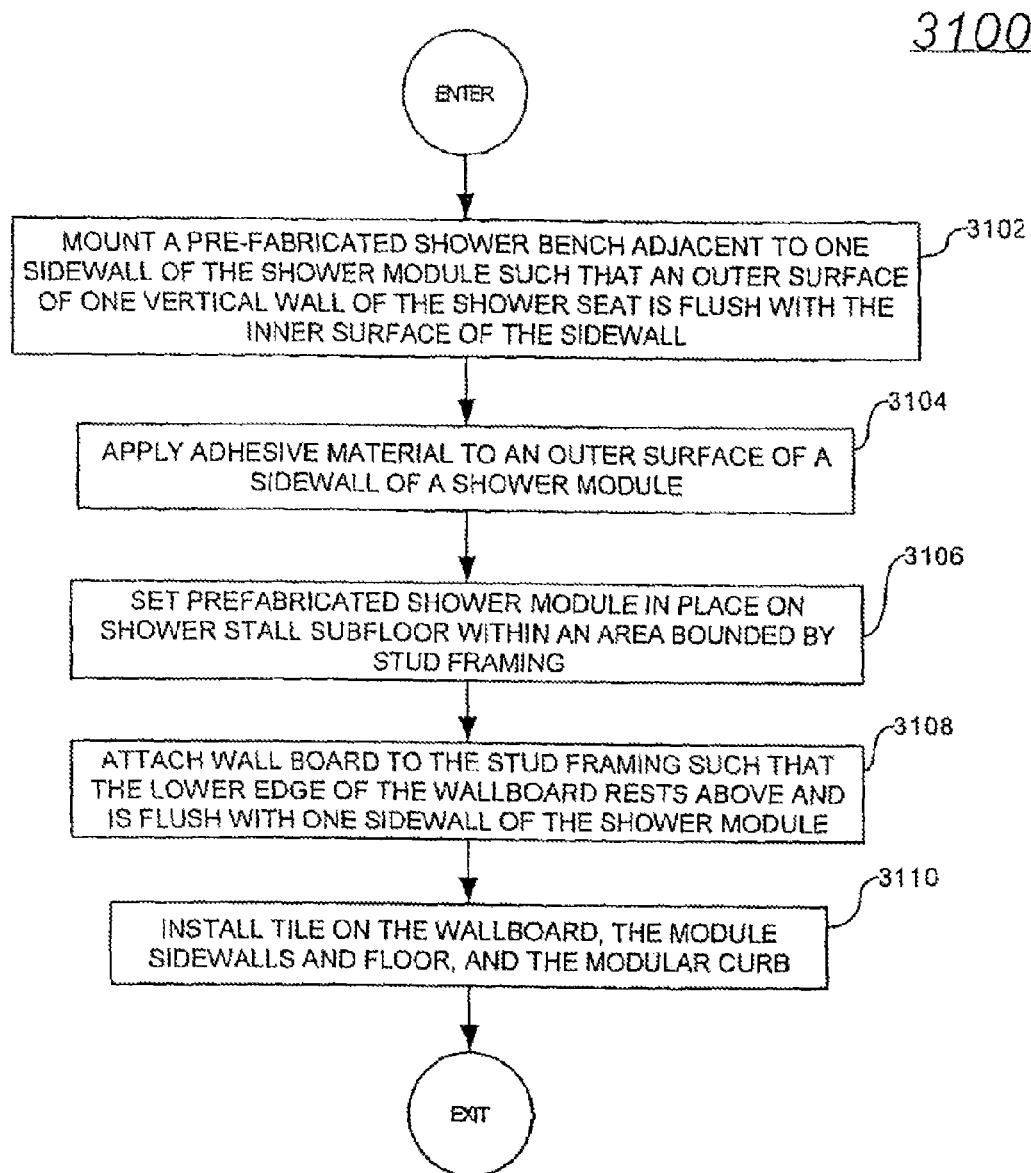


FIG. 31

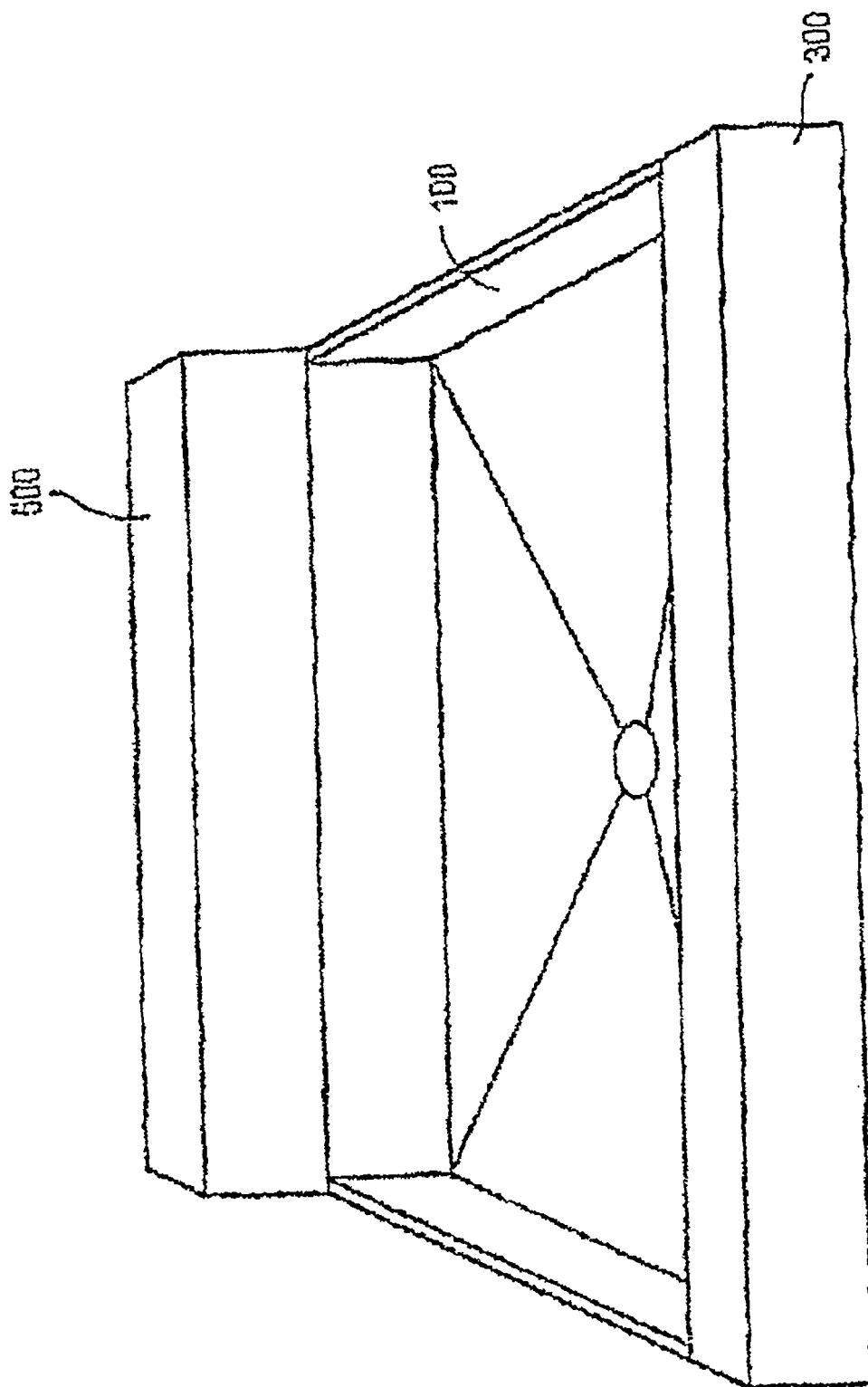


FIG. 32

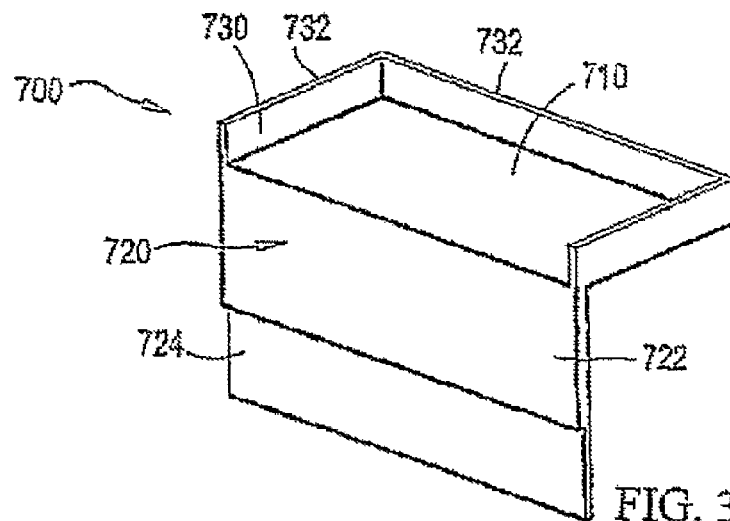


FIG. 33

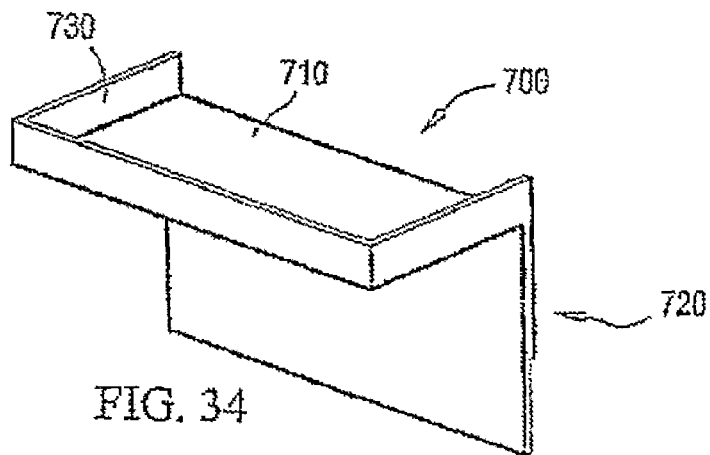


FIG. 34

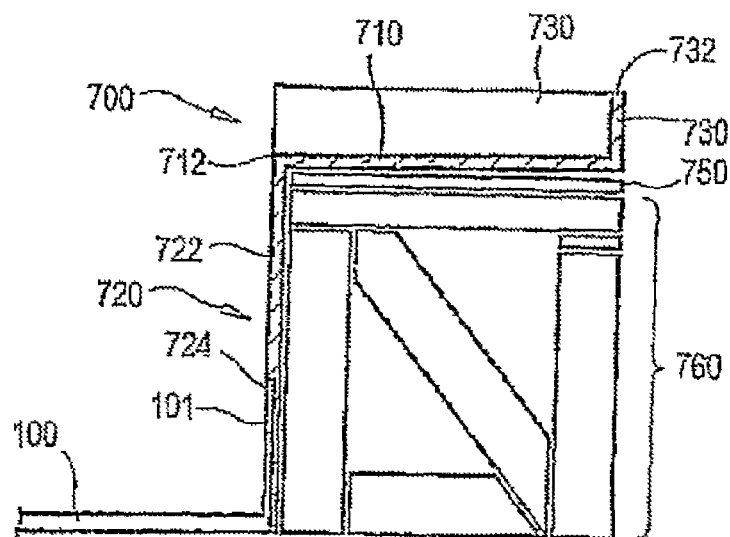
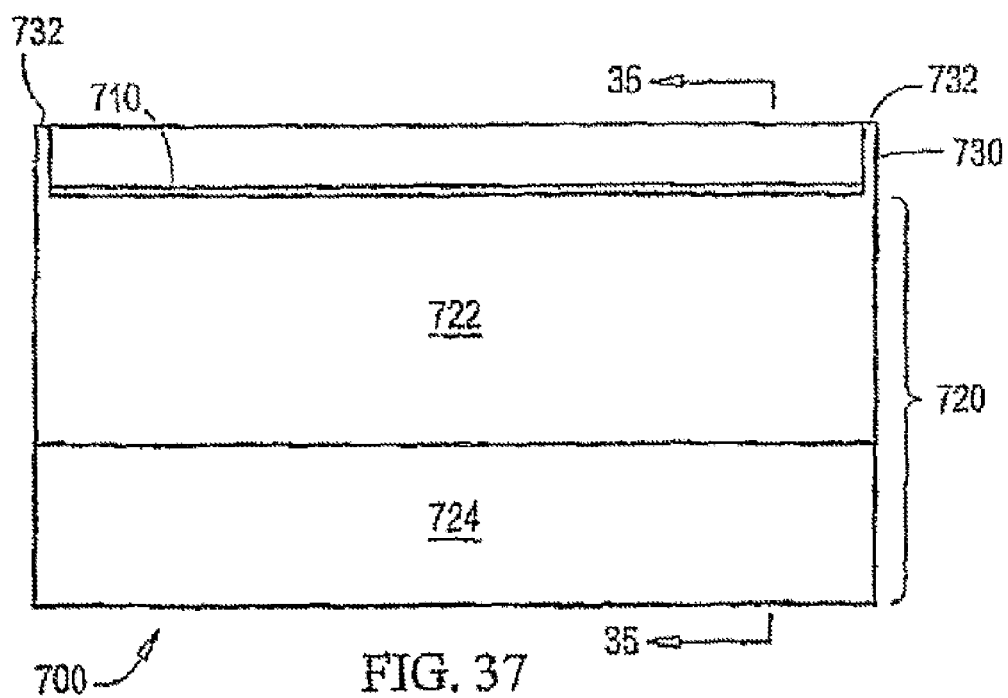
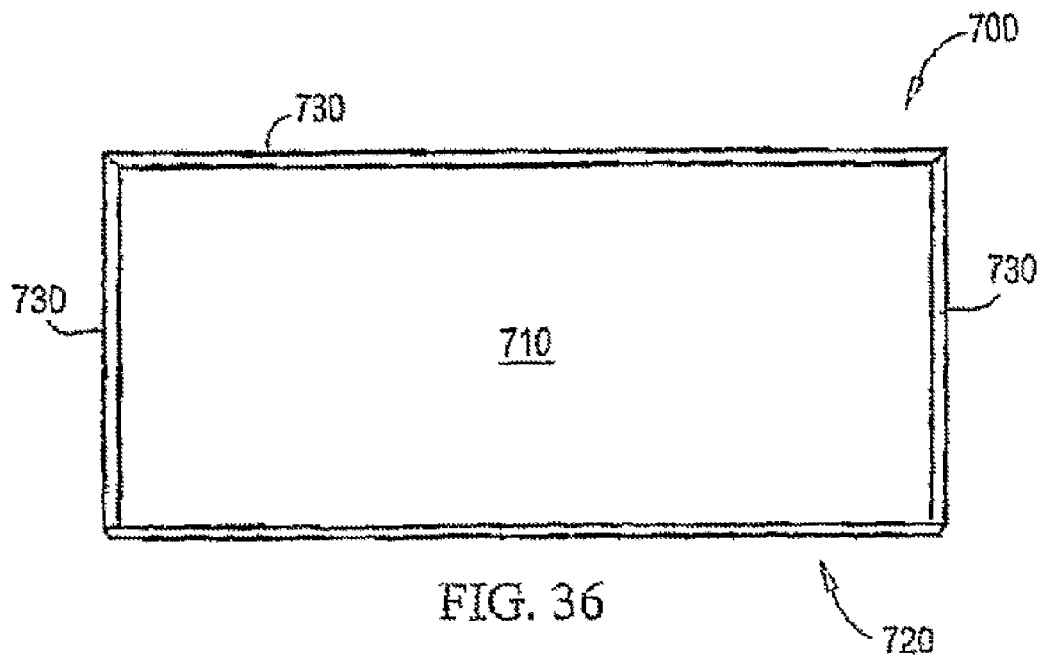


FIG. 35



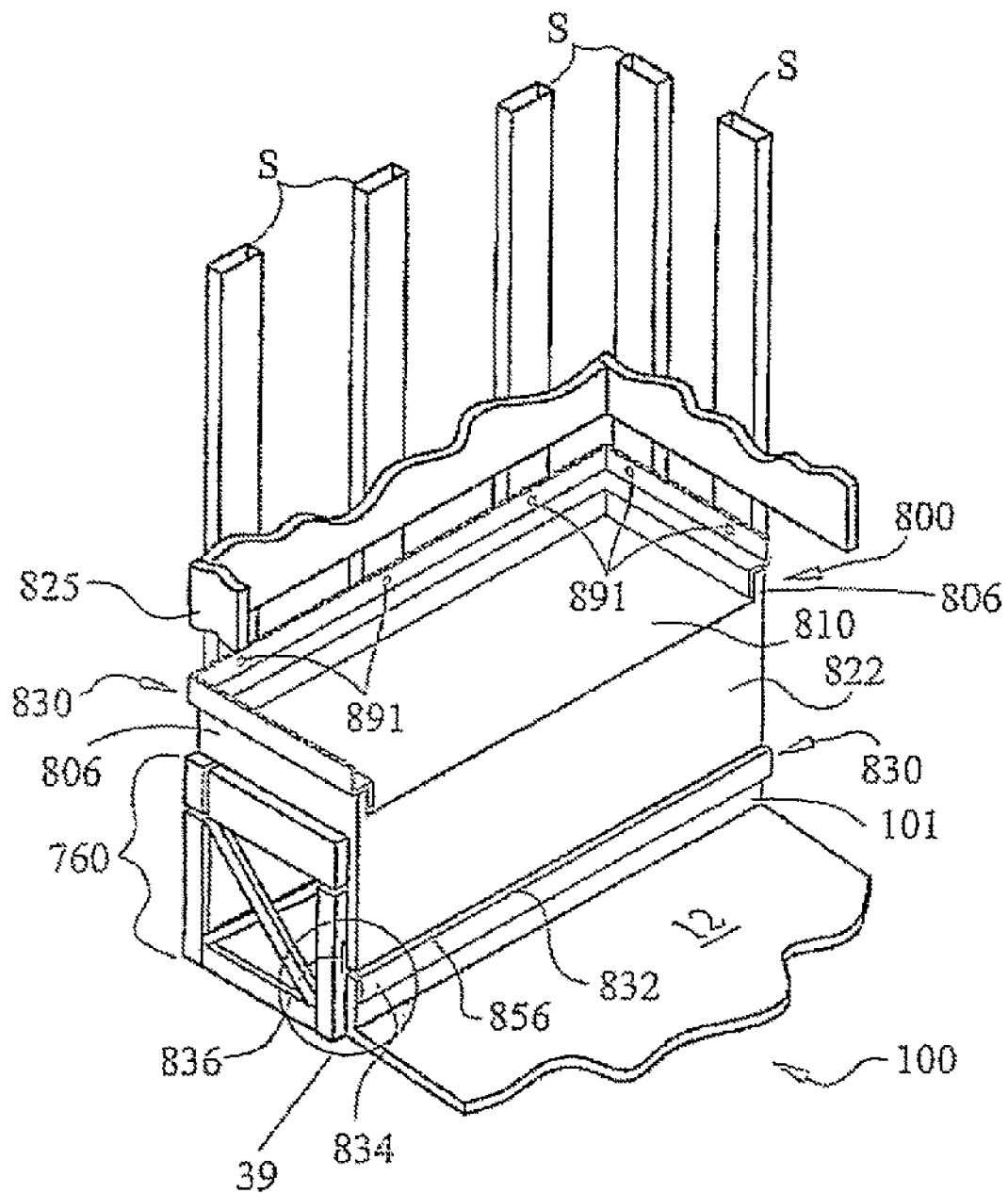


FIG. 38

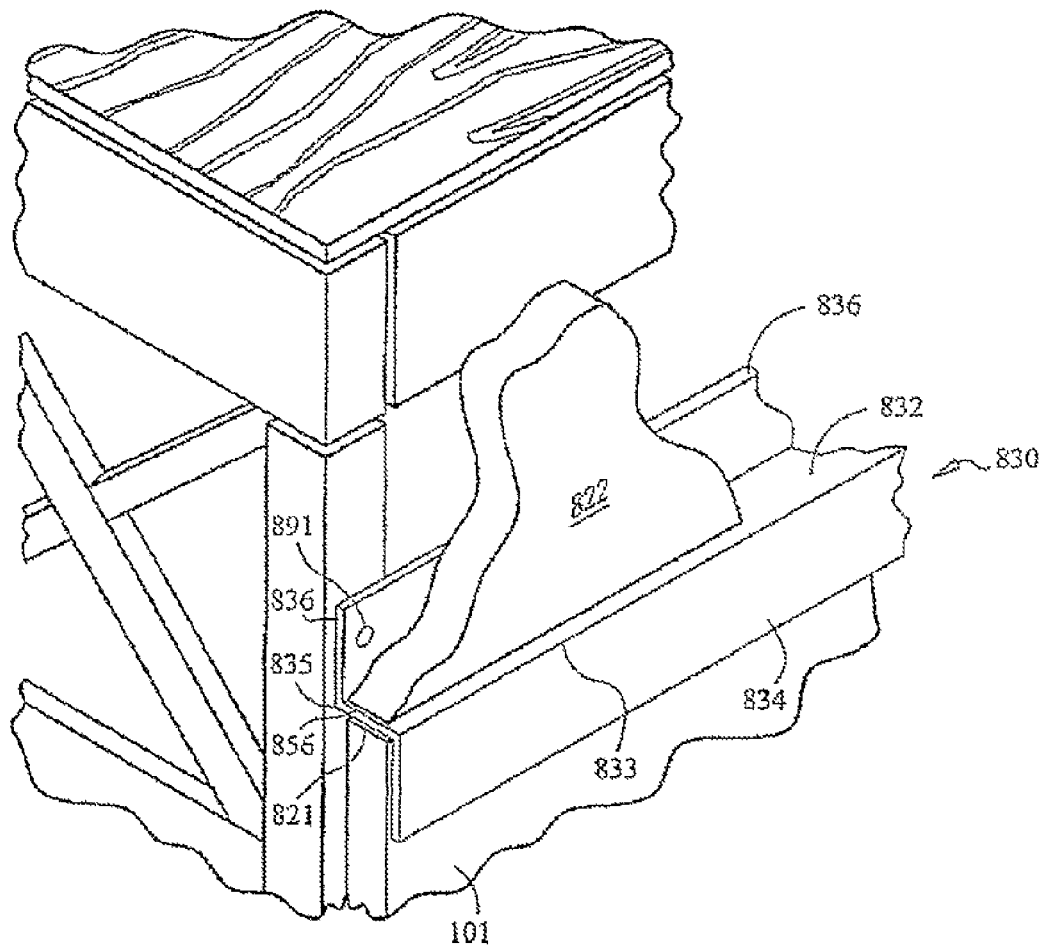


FIG. 39

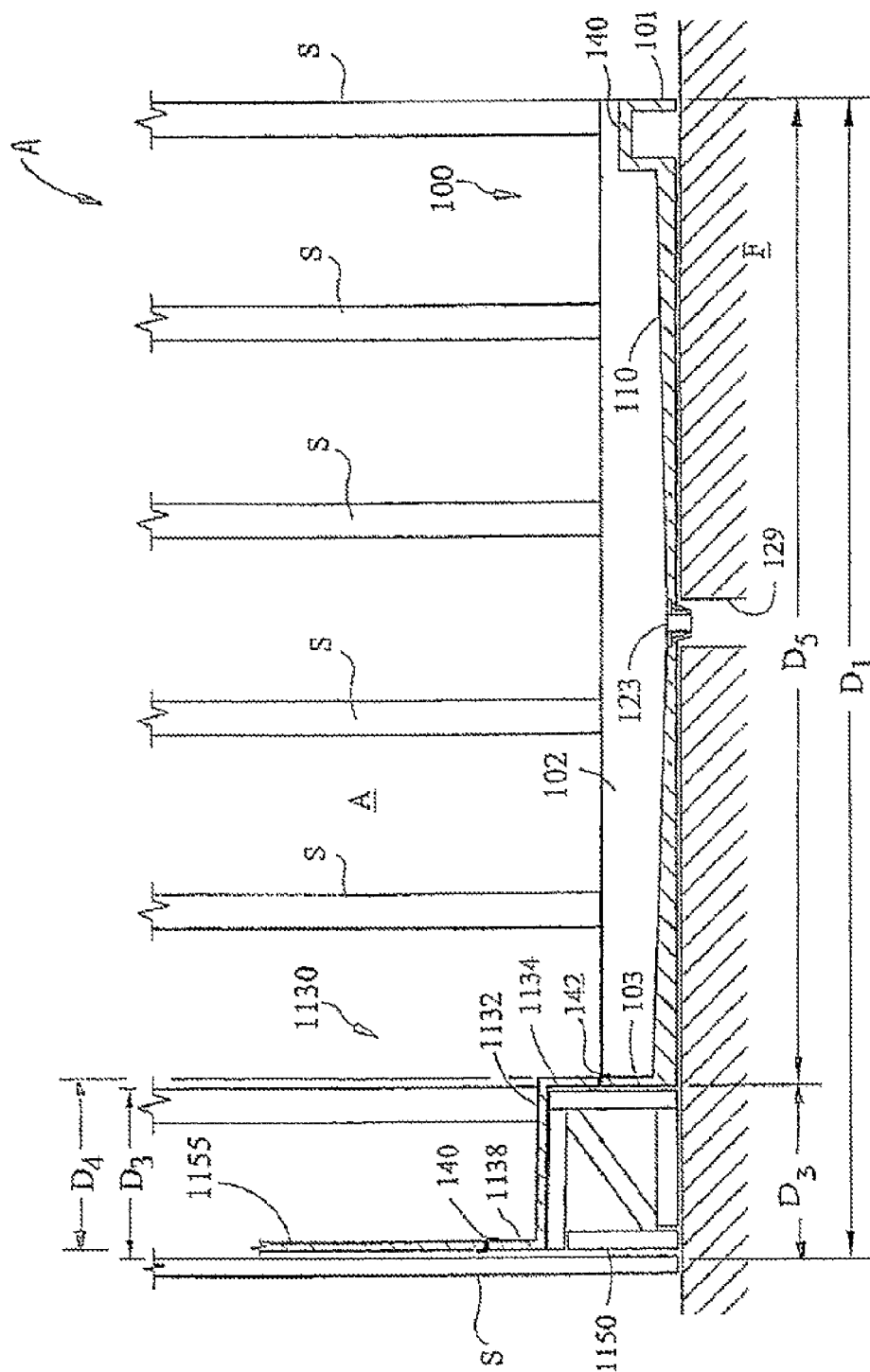


FIG. 40A



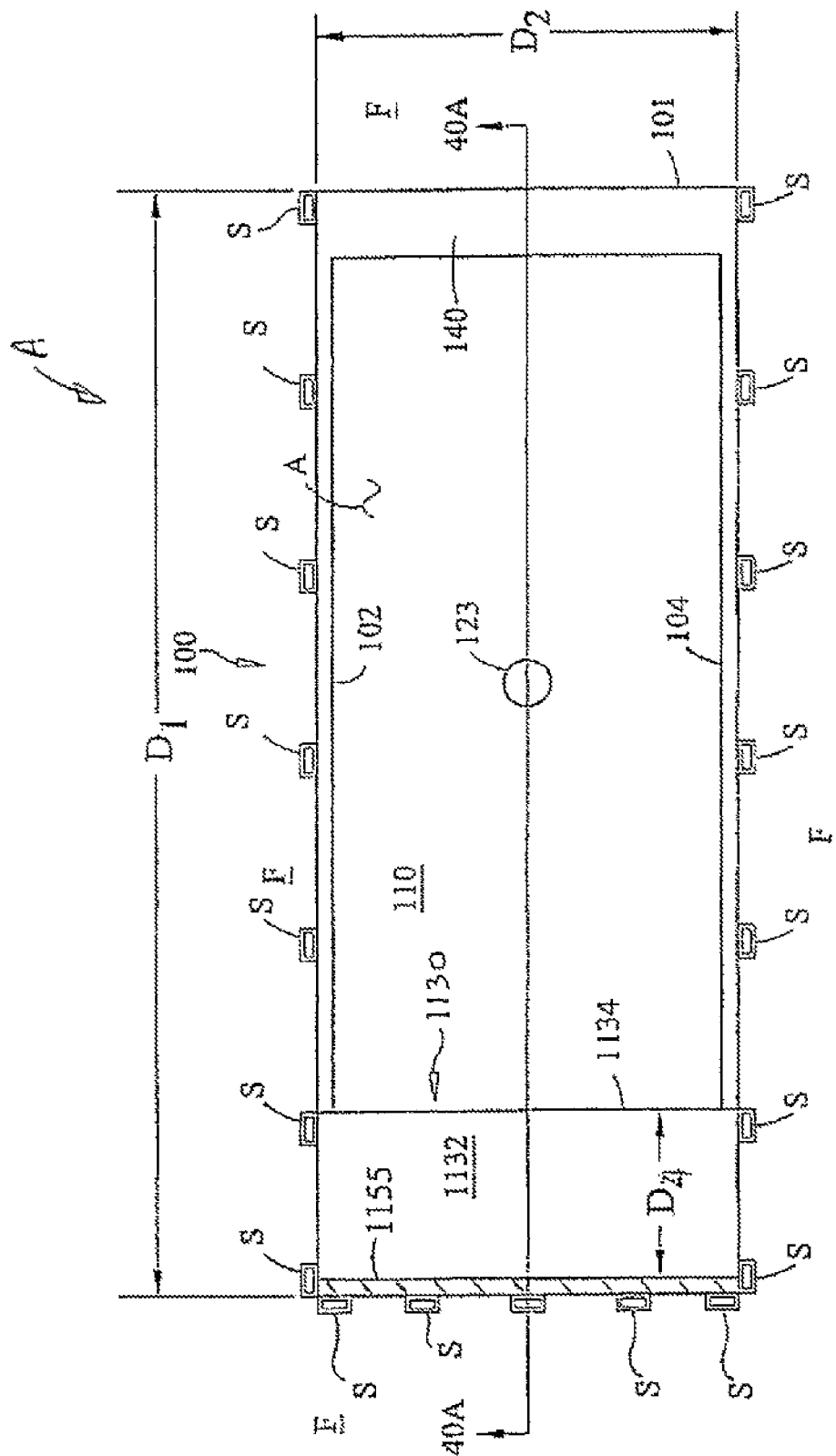


FIG. 40B

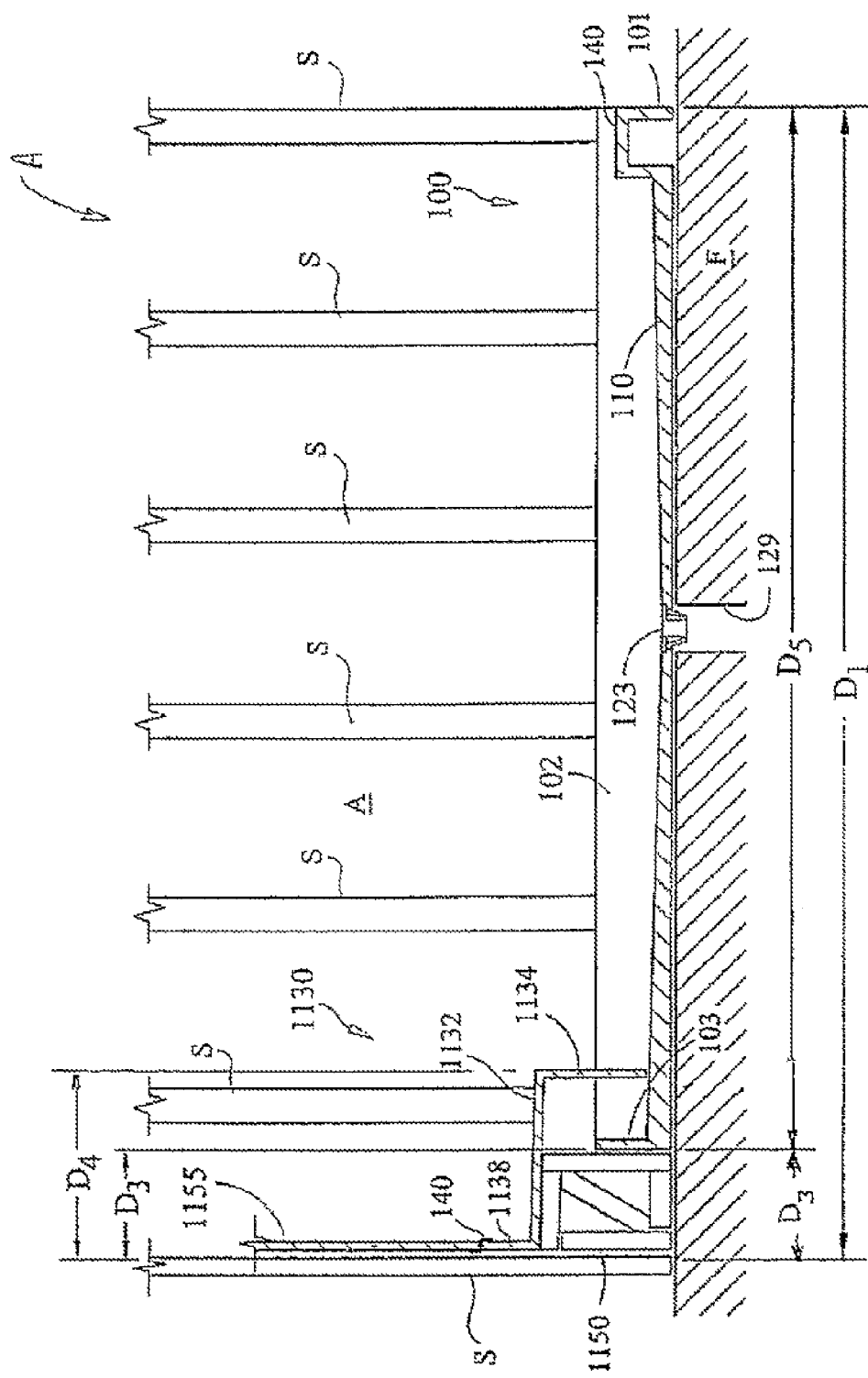


FIG. 41A

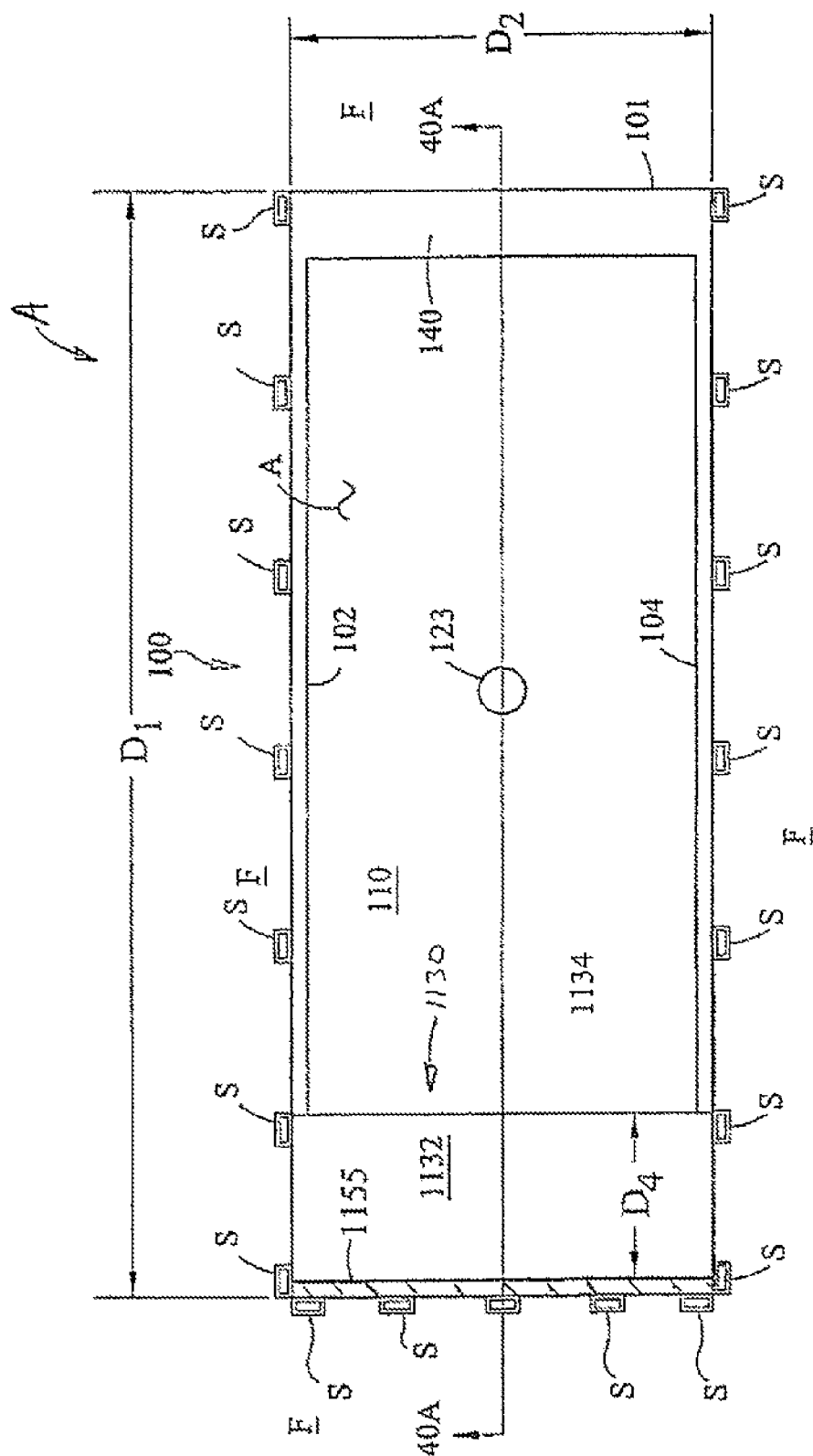


FIG. 41B

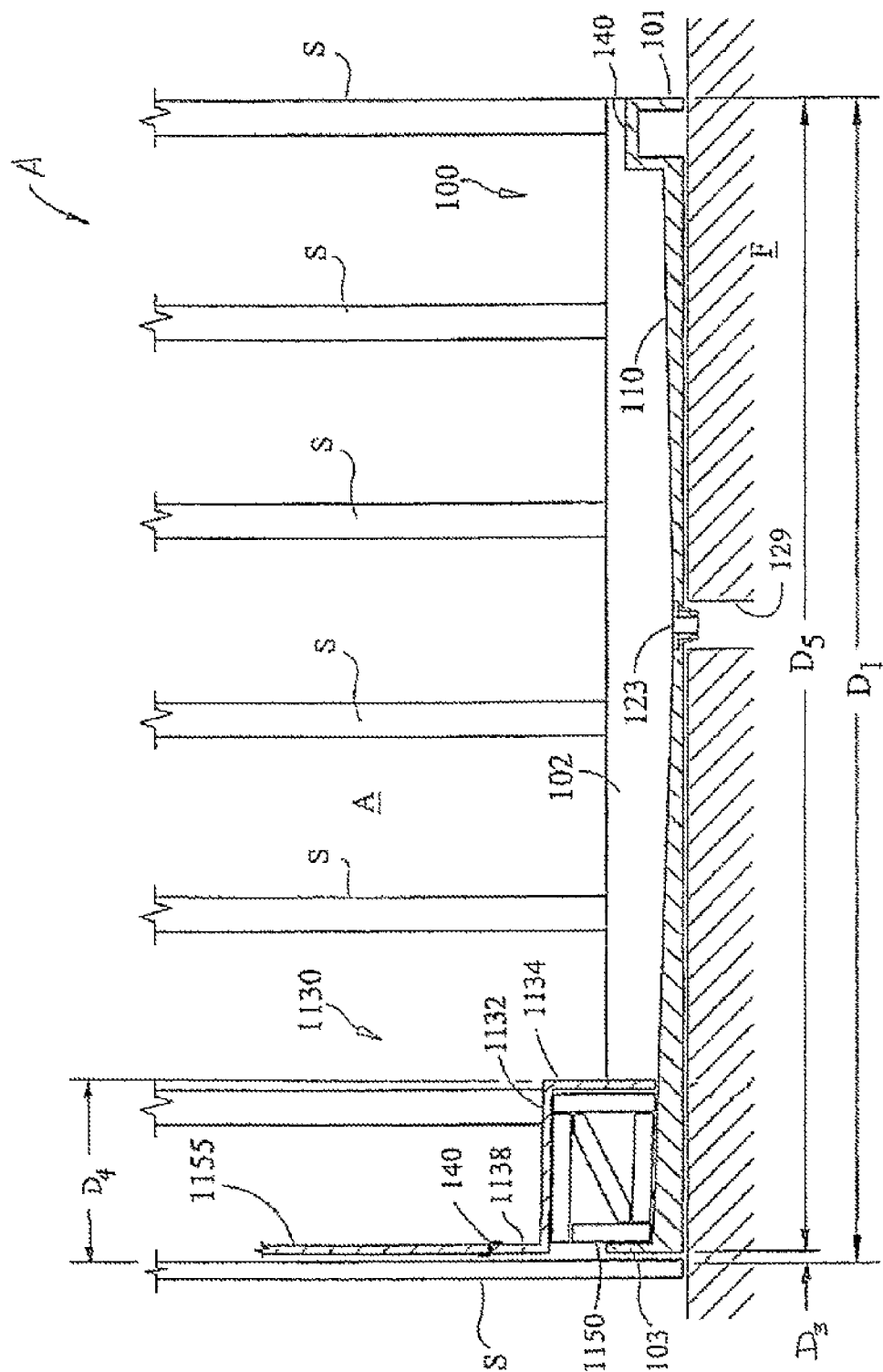


FIG. 42A

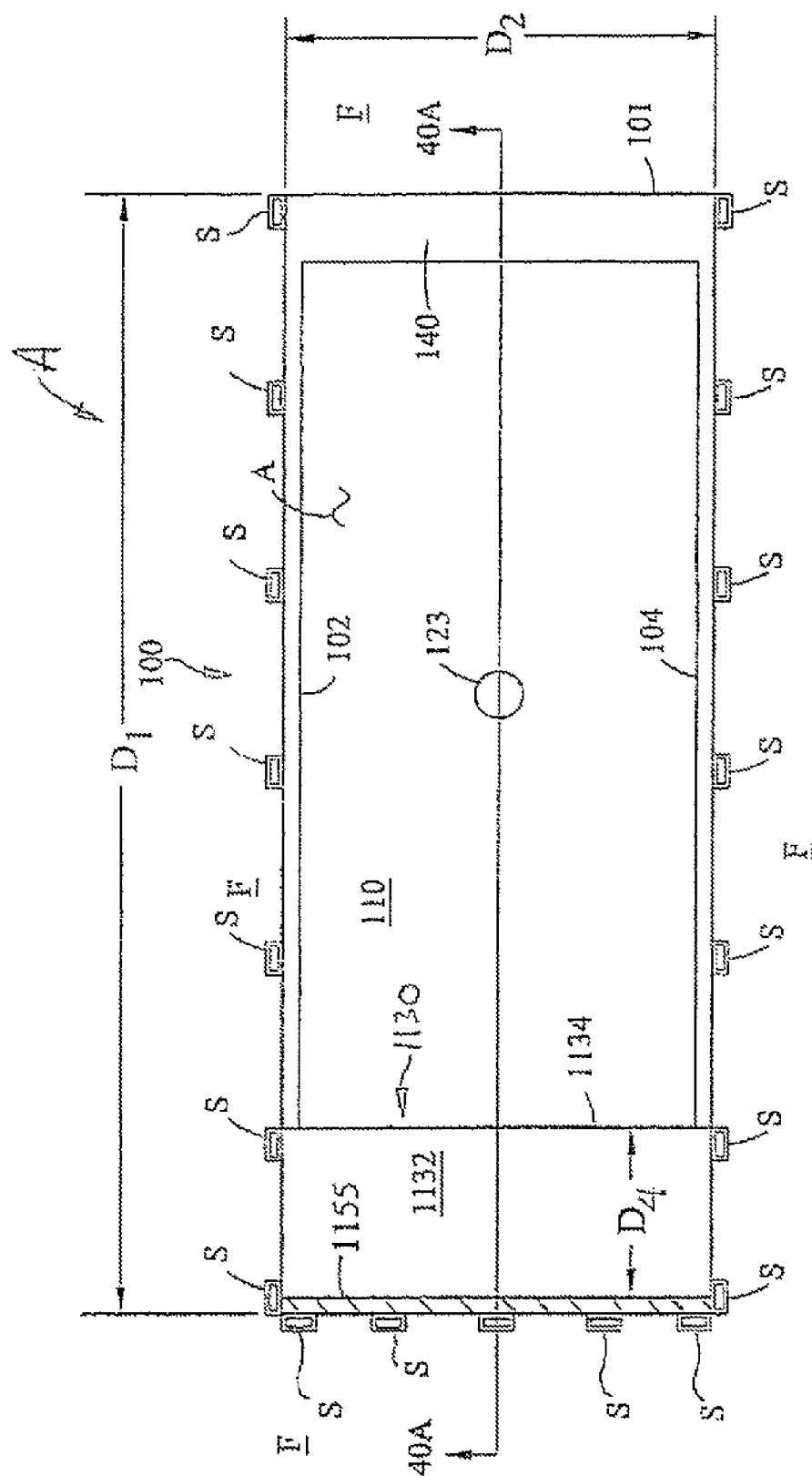


FIG. 42B

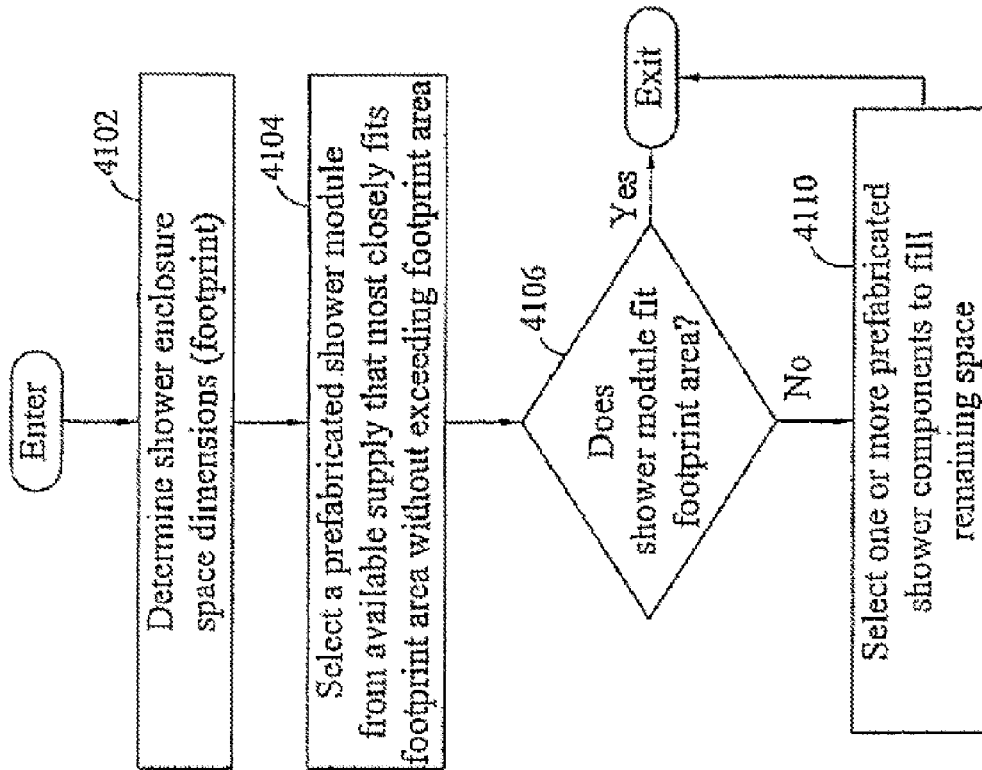


FIG. 44

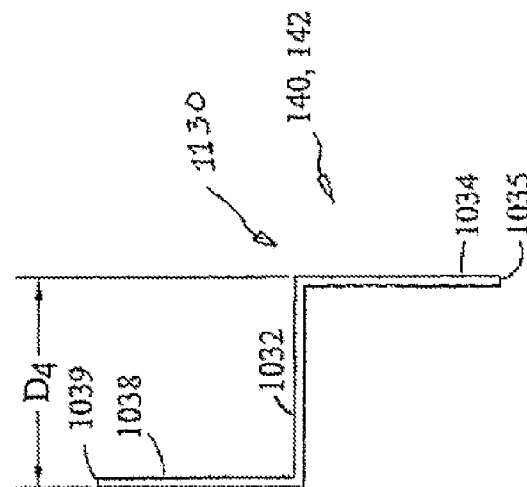


FIG. 43

## SHOWER ENCLOSURE DESIGN AND ASSEMBLY METHODS USING PREFABRICATED SHOWER BENCHES

### CROSS-REFERENCE TO RELATED APPLICATIONS

The present application is a continuation of co-pending U.S. patent application Ser. No. 12/706,792, which is a continuation in part of prior co-pending U.S. patent application Ser. No. 11/724,913 filed on Mar. 17, 2007, which was commonly filed with the following U.S. patent application Ser. No. 11/724,873 entitled "Ribbed Prefabricated Polyurethane Shower Module," U.S. patent application Ser. No. 11/724,914 entitled "Method for Manufacturing a Prefabricated Modular Shower Curb and Associated Modular Shower Curb," U.S. patent application Ser. No. 11/725,113 entitled "Prefabricated Shower Pan Having Varying Sidewall Heights and Method of Attaching a Modular Curb Thereto," U.S. patent application Ser. No. 11/724,912 entitled "Improved Drain Wall for a Prefabricated Shower Module," and U.S. patent application Ser. No. 11/725,112 entitled "Improved Method for Manufacturing a Prefabricated Shower Module." The present application is also a continuation in part of the prior co-pending U.S. patent application Ser. No. 12/435,959, filed May 5, 2009, entitled "Waterproof Junctionure," and U.S. patent application Ser. No. 12/463,803, filed May 11, 2009, entitled "Improved Method of Manufacture and Installation of Prefabricated Shower Benches and Associated Shower Benches."

The disclosures of each of the above-listed applications are expressly incorporated herein by reference as though fully set forth herein.

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

The present invention relates generally to the design and manufacture of shower enclosures, and more particularly relates to the use of prefabricated shower benches in a shower enclosure to permit the shower enclosure designer and installer to precisely fit the components of the enclosure into the allotted space.

#### 2. Description of the Prior Art

Most tile-covered shower enclosures are created using complicated construction methods. For example, using conventional techniques, a skilled installer frames out the area to be enclosed using two-by-four wooden or aluminum studs to create a frame and curb. Felt or tar paper is then laid over a subfloor area enclosed within the newly formed frame. A flexible, leak-proof liner is installed on top of the felt or tar paper and attached to the frame. Next, the installer attaches dry wall boards to the framing studs, creating shower sidewalls. A hole is cut in the liner to allow for a drain, and a layer of mortar is applied to the shower sidewalls and curb and allowed to cure. Additional mortar is applied on top of the leak-proof liner and hand-shaped to form a shower floor which slopes toward the drain such that water from the shower flows toward the drain. After the mortar has cured, shower tile is applied to the sidewalls and floor to create the finished enclosure.

The process of creating the enclosed shower is time-consuming and requires a certain degree of skill in order to maintain the proper pitch and uniformity in shaping the floor. Irregularities in the pitch of the floor can cause water from the shower not to drain properly or make tiling the shower enclosure difficult. The liners are also susceptible to punctures or

leaks and may be difficult for the installer to properly form square corners at the intersection of the shower sidewalls and floor. Additionally, the mortar layer used to create the floor is necessarily thick in order to form a sloped surface, therefore the time required for the floor to cure before applying tile may be quite long (e.g., greater than 24 hours).

In recent years, the process of shower installation has been vastly improved by the introduction of prefabricated shower base modules used for forming the floor. Use of the prefabricated modules significantly decreases the amount of time and skill required to construct a tile-covered shower enclosure, as well as providing more of a consistent and reliable flooring surface upon which to tile. These modules are pre-constructed molded units having a sloping floor, an integrated drain, curb, sidewalls, and a horizontal surface on the top of each sidewall for mounting drywall such that the drywall is substantially flush to the module sidewalls. Installation of the module involves securing a section of drain pipe to the drain, applying adhesive and sealing material to the subfloor where the module will rest, and seating the module on the subfloor. Tile can then be applied directly to the shower walls and module without the need for first applying mortar.

However, these prefabricated shower modules contain weaknesses in the design which add cost to the final product. For instance, certain modules are manufactured using plastics-forming processes that inject molten polymeric resins into molds. After filling the mold with the resin, the module must cool (e.g., solidify) before being removed. If the module is removed before it is completely solid, bowing may occur as the module hardens. However, the mold or "tool" for creating each unit can be quite expensive, thus a manufacturer generally limits the number of tools for producing each module. Therefore, the number of modules manufactured in a given amount of time depends on the amount of time required for one module to sufficiently cool enough to be removed from the mold.

Further, each size module requires a specific mold, thus the manufacturer is forced to limit the selection of available modules to a few standard sizes. Because the curb may be integrated into the shower module, both the positioning of the curb, as well as the overall dimensions of the module are set by a single tool. The design options for a customer (e.g., an architect, a designer, a contractor, an installer, or homeowner) desiring to implement a prefabricated shower module are therefore limited to a few set arrangements.

Additionally, features such as shower benches or ledges presently must still be constructed by hand, or added in a piece-meal fashion, thereby compromising the leak-proof integrity of the prefabricated shower module.

Also, it is well known that the designing of a floor plan within a given fixed total square footage area is a challenging task. The challenge to the designer is to maximize the utility of the design, the feasibility of which is usually diminished due to the fact that certain standard features in any given design have fixed dimensions, i.e. dimensions around which the designer must create the overall floor plan.

One such feature is the prefabricated shower base module used in most shower construction today. Manufacturers of these products offer them in a variety of fixed dimensions. It is not desirable to manufacture shower based modules to be variable in dimension, as to do so would increase the risk of leakage at seams and joints within the module itself, defeating the purpose of using such a module in the first place.

In designing a shower enclosure space, it often occurs that the space available is somewhat larger in one or more dimension than the dimensions of the prefabricated shower base modules available on the market. When this happens, the

sizes of the available shower base modules are “between sizes” relative to the available space for the enclosure. Obviously, it is always desirable to make the shower enclosure volume as large as possible, especially where the available “extra” space would otherwise be unused volume hidden between adjacent walls.

Therefore, a need exists for, among other things, methods for manufacturing and installing prefabricated shower benches in a system including prefabricated shower modules to produce a tiled shower enclosure, and the resulting benches, to overcome the shortcomings of the prior art.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of a prefabricated shower module in accordance with one embodiment of the present invention.

FIG. 2 is a side cross-sectional elevational view of the prefabricated shower module of FIG. 1 along the line 2-2.

FIG. 2A is a close up of the area of detail shown in FIG. 2.

FIG. 3 is a bottom plan view of the prefabricated shower module of FIG. 1, illustrating a horizontal support rib arrangement.

FIG. 4 is a front/top perspective view of the shower module of FIG. 1.

FIG. 4A is a front/top perspective view of a shower module in accordance with an alternative embodiment of the present invention.

FIG. 4B is a front/top perspective view of a shower module in accordance with another alternative embodiment of the present invention.

FIG. 5 is a cross-sectional view of a prior art shower module drain assembly.

FIG. 6 is a cross-sectional view of an exemplary drain assembly, in accordance with an embodiment of the present invention.

FIG. 7 is a bottom plan view of a prefabricated shower module, illustrating an exemplary sunburst support rib arrangement, in accordance with an alternative embodiment of the present invention.

FIG. 8 is a bottom plan view of a prefabricated shower module, illustrating an exemplary diamond support rib arrangement, in accordance with an alternative embodiment of the present invention.

FIG. 9 is a bottom plan view of a prefabricated shower module, illustrating an exemplary honeycomb support rib arrangement, in accordance with another alternative embodiment of the present invention.

FIG. 10 is a front/top perspective view of a prefabricated shower module having pre-scored indentations for attaching a modular curb along any sidewall, in accordance with another alternative embodiment of the present invention.

FIG. 11 is a front/top perspective view of a handicapped-accessible prefabricated shower module in accordance with an alternative embodiment of the present invention.

FIG. 12 is a front/top perspective view of a handicapped-accessible prefabricated shower module in accordance with another alternative embodiment of the present invention.

FIG. 13 is a front elevational view of the prefabricated shower module of FIG. 11.

FIG. 14 is a front/top perspective view of a prefabricated shower module having an integrated curb, in accordance with another alternative embodiment of the present invention.

FIG. 15 is a front/top perspective view of a prefabricated shower module having an integrated curb, in accordance with another alternative embodiment of the present invention.

FIG. 16 is a cross-sectional view of the prefabricated shower module of FIG. 15 along the line 16-16.

FIGS. 17-18 are logic flow diagrams of various steps executed to implement a method for manufacturing an improved, prefabricated leak-proof shower module, in accordance with exemplary embodiments of the present invention.

FIG. 19 is a front/top perspective view of a prior art modular curb.

FIG. 20 is a front/top perspective view of a prefabricated modular curb in accordance with one embodiment of the present invention.

FIG. 21 is a front/bottom perspective view of a prefabricated modular curb in accordance with one embodiment of the present invention.

FIG. 22 is a side/top perspective view illustrating an exemplary installation of the modular curb of FIG. 21 with the shower module of FIG. 1.

FIG. 23 is a side/top perspective view illustrating an exemplary installation of an alternative embodiment of a modular curb in accordance with an exemplary embodiment of the present invention.

FIG. 24 is a front/bottom perspective view of a prefabricated modular curb in accordance with an alternative embodiment of the present invention.

FIG. 24A is a side cross-sectional view illustrating an exemplary installation of an alternative embodiment of a modular curb in accordance with an exemplary embodiment of the present invention.

FIGS. 25-27 are logic flow diagrams of various steps executed to implement a method for creating a tiled shower stall using a prefabricated leak-proof shower module and a prefabricated modular curb, in accordance with exemplary embodiments of the present invention.

FIG. 28 is a front/top perspective view of a prefabricated shower seat in accordance with an embodiment of the present invention.

FIG. 29 is a front/top perspective view of a prefabricated shower seat in accordance with an alternative embodiment of the present invention.

FIG. 30 is a side elevational view illustrating an exemplary installation of the prefabricated shower seat of FIG. 28 installed with a prefabricated shower module of FIG. 1, in accordance with an embodiment of the present invention.

FIG. 31 is a logic flow diagram of various steps executed to implement a method for creating a tiled shower stall using a prefabricated leak-proof shower module and a prefabricated shower seat, in accordance with exemplary embodiments of the present invention.

FIG. 32 is a front/top perspective view of a complete shower enclosure system constructed using a prefabricated shower module, a prefabricated modular curb, and a prefabricated shower bench, in accordance with exemplary embodiments of the present invention.

FIG. 33 is a front perspective view of a modified form of a prefabricated waterproof shower bench in accordance with this invention.

FIG. 34 is a rear perspective view of the shower bench of FIG. 33.

FIG. 35 is a side elevational cross-sectional view of the shower bench of FIG. 33, taken along lines 35-35 of FIG. 36, supported by a support structure.

FIG. 36 is a front elevational view of the shower bench of FIG. 33.

FIG. 37 is a top plan view of the shower bench of FIG. 33.

FIG. 38 is a partial perspective cutaway view of another embodiment of a shower bench in accordance with this invention.

FIG. 39 is an enlarged view of the area of detail “A” shown in FIG. 38.



5

FIG. 40A is a cross sectional elevational view of a shower enclosure space showing a water proof prefabricated shower module and a bench installed therein, where the bench leg wall is positioned in registry with a sidewall of the shower module.

FIG. 40B is a top plan view of the shower enclosure space shown in FIG. 40A.

FIG. 41A is cross sectional elevational view of a slightly smaller shower enclosure than the shower enclosure shown in FIG. 40, such that the shower bench leg wall is located inside the sidewall of the shower module.

FIG. 41B is a top plan view of the shower enclosure space shown in FIG. 41A.

FIG. 42A is a cross sectional view of a shower enclosure wherein the shower bench is located entirely within the sidewall of the shower module.

FIG. 42B is a top plan view of the shower enclosure space shown in FIG. 42A

FIG. 43 is a left side elevational view of an example of a flashing/waterproofing article which may be employed with this invention.

FIG. 44 is a logic flow diagram of various steps executed to implement a method for creating a shower enclosure.

#### DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENT(S)

Before describing in detail exemplary embodiments that are in accordance with the present invention, it should be observed that the embodiments reside primarily in combinations of apparatus components and processing steps related to implementing a method for improving manufacturability of a pre-molded leak-proof shower module having surfaces for receiving shower tile or stone thereon and the associated shower module. Accordingly, the apparatus and method components have been represented where appropriate by conventional symbols in the drawings, showing only those specific details that are pertinent to understanding the embodiments of the present invention so as not to obscure the disclosure with details that will be readily apparent to those of ordinary skill in the art having the benefit of the description herein.

In this document, relational terms, such as “first” and “second,” “top” and “bottom,” and the like, may be used solely to distinguish one entity or element from another entity or element without necessarily requiring or implying any physical or logical relationship or order between such entities or elements. The terms “comprises,” “comprising,” or any other variation thereof are intended to cover a non-exclusive inclusion, such that a process, method, article, or apparatus that comprises a list of elements does not include only those elements, but may include other elements not expressly listed or inherent to such process, method, article, or apparatus. The term “plurality of” as used in connection with any object or action means two or more of such object or action. A claim element preceded by the article “a” or “an” does not, without more constraints, preclude the existence of additional identical elements in the process, method, article, or apparatus that includes the element. The term “tile” also encompasses “stone” and/or “marble.” The term “tiled” means any surface having tile, stone, and/or marble applied thereon. The term “sidewall,” in relation to a shower module, means any vertical surface rising above the floor of the shower module along one or more peripheral edges and may be any height or any width, including, without limitation, an integrated curb. The term “shower enclosure space” refers to the volume defined by the framed-out walls, the area where the shower door or access area will reside, the bathroom sub-floor, and the ceiling.

6

Generally, the present invention encompasses a prefabricated modular system for constructing a tiled shower enclosure; an improved prefabricated shower module, modular curb, and shower seat for use within the system, and methods for manufacturing and installing the above components.

In describing the invention, reference will be made to a prefabricated leak-proof shower module suitable for use in constructing a tiled shower, which includes a plurality of sidewalls, and a floor that is bounded along at least one peripheral edge by at least one sidewall that extends vertically from the peripheral edge. The floor has an upper surface sloping downward from each peripheral edge toward a drain aperture and a lower surface with a plurality of support ribs, where each support rib extends downward from the lower surface to terminate in a common horizontal plane. Additionally, the upper surface may contain a plurality of pitching ribs which provide a uniform pitch from each peripheral edge to the drain aperture. Each support rib runs and each pitching rib runs either parallel to, perpendicular to, or at an acute angle to, at least one peripheral edge of the floor. The shower module may be created using polyurethane reaction injection molding processing. Alternative embodiments may include a horizontal bottom plane and/or an integrated molded curb.

A slightly modified version of a prefabricated modular curb suitable for use in constructing a tiled shower enclosure includes a mounting wall with an outer surface for engaging a sidewall of a shower module, an exterior wall, and a top wall that extends from an upper edge of the exterior wall to the upper edge of the mounting wall in a plane either substantially perpendicular to the mounting wall and to the exterior wall or pitching downward from the exterior wall to the mounting wall. The curb further includes at least one reinforcing curb rib that is attached to at least one of the top curb wall, the inner surface of the mounting wall, the inner surface of the exterior wall, and the bottom wall if any, and which rib runs either parallel to, perpendicular to, or at an acute angle to the mounting wall or the exterior wall.

A still further embodiment of a prefabricated shower bench for installation in a tiled shower includes a seating member having a plurality of peripheral edges, and at least three sidewalls, wherein each sidewall is connected to a corresponding peripheral edge of the seating member along an upper edge. One of the sidewalls includes a setback area along its entire lower edge that has a height greater than the height of one of the sidewalls of a prefabricated shower module. The lower edge of each sidewall terminates in a common plane.

Reference will also be made to a prefabricated shower bench for installation in a tiled shower, which includes a seating member having a plurality of peripheral edges, at least one sidewall depending downwardly from one or more of the peripheral edges. The seating member, and preferably also the depending sidewall, are associated with a support structure which can be manufactured as part of the shower bench, manufactured separately from the shower bench but associated with and/or attached to the shower bench during manufacturing, or installed in situ (i.e. in the field).

The forgoing apparatus are but a few of the many configurations of components that can be employed in the design and construction of the shower enclosures of this invention, and the scope of the invention is not intended to be limited to any particular component.

#### Prefabricated Shower Module.

The present invention can be more readily understood with reference to FIGS. 1-32, in which like reference numerals designate like items. FIGS. 1-4 depict an exemplary prefabricated leak-proof shower module 100 suitable for use in constructing a tiled shower in accordance with one embodi-

ment of the present invention. As depicted in FIGS. 1-4, the exemplary shower module 100 includes a floor 110, and vertical sidewalls 101, 102, 103, 104 (4 shown). The upper surface 112 of the floor 110 and the vertical sidewalls 101, 102, 103, 104 are suitable for retaining tile, stone, or marble installed thereon. Each sidewall 101, 102, 103, 104 extends vertically from a peripheral edge of the floor 110. The floor 110 has an upper surface 112 that slopes downward from each peripheral edge toward a drain aperture 130, and a lower surface 114 that connects to a plurality of support ribs 120. The upper surface 112 slopes downward from each peripheral edge to the drain aperture 130 at a pitch of  $\frac{1}{8}$ "/foot or greater.

Each support rib 120 extends downward from the lower surface 114 such that the bottom edge 122 of each support rib 120 terminates in a common horizontal plane. Additionally, each support rib 120 runs either parallel to, perpendicular to, or at an acute angle to, at least one peripheral edge of the floor 110. When the shower module 100 is installed to construct a shower enclosure, the shower module 100 is positioned on a subfloor of the shower enclosure in such a manner that the plurality of support ribs 120 provide support for the shower module 110 by resting on the subfloor, and a drain wall 132 surrounding the drain aperture 130 is positioned inside or above an opening in the subfloor that contains a plumbing connection.

In an alternative embodiment, as shown in FIG. 4A, the shower module 700 includes a bottom panel 160 that extends from each sidewall 101, 102, 103, 104 and/or each peripheral edge to the drain wall 132 in a horizontal plane. Thus, the bottom panel 160 rests on the subfloor of the shower enclosure when the shower module 100 has been installed. Additionally, the bottom edge 122 of each support rib 120 is connected to the bottom panel 160.

In another alternative embodiment, as shown in FIG. 4B, the shower module 800 includes a floor 110 that extends in a horizontal plane from each sidewall 101, 102, 103, 104 and/or peripheral edge to a drain wall 132 surrounding the drain aperture 130. Pitching ribs 121 extend upwards from the upper surface 112 and terminate in an upper edge sloping downwards from the peripheral edge to the drain aperture 130.

In one embodiment, at least one sidewall 104 has a height that is lower than the height of the remaining sidewalls 101, 102, 103. The height of the lower sidewall 104 is preferably at least one inch lower than the height of the remaining sidewalls 101, 102, 103. The lowered height insures that in the event that the plumbing connection becomes clogged, any standing water in the shower module 100 will spill over onto the floor of the bathroom in which the shower enclosure is constructed instead of seeping into the walls; preventing water damage or mold accumulation. Additionally, the top surface of any sidewall 101, 102, 103, 104 should either be flat or pitched towards the shower module 100 so that any water accumulating on the top surface flows back into the shower module 100.

The height of the lower sidewall 104 is preferably sufficient to permit installation of a modular curb 300 (see FIG. 21) adjacent to the sidewall 104. The lower sidewall 104 may be initially molded to the required height, molded to the same height as the other sidewall 101, 102, 103 and trimmed as a part of post-production process, or may contain a horizontal fatigue line 108 (see FIG. 10) located at a height suitable for a portion of the sidewall 104 to be removed, thereby allowing installation of a modular curb adjacent to the sidewall. The horizontal fatigue line 108 denotes a thinner section of the sidewall 104 and can be easily broken, or cut, and removed. The fatigue line 108 may be molded into the sidewall during an injection molding process, or pre-scored by the manufac-

turer. The fatigue line 108 may be included on any or all of the sidewalls 101, 102, 103, 104 so that an installer may have the option of choosing a sidewall 101, 102, 103, 104 for attaching the prefabricated modular curb 300. After installation of tile on the surface of the shower module 100, any inherent weakness in a sidewall 101, 102, 103, 104 still containing a horizontal fatigue line 108 does not affect the integrity of the shower enclosure and is obscured by the tile.

The outer surface of the lower sidewall 104 may include an attachment feature 106 (see FIG. 23) for engaging a corresponding attachment feature 316 of a modular curb 300. Exemplary methods for attaching the modular curb 300 to the shower module 100 are discussed in greater detail in Section 2. The attachment feature 106 may be a tab, a notch, a slot, a tongue, a groove, a ridge, a peg, an aperture, an interlocking clip, an adhesive material, or any other structure suitable for connecting the modular curb 300 to the shower module 100.

The shower module 100 may constructed using polyurethane reaction injection molded processes. When using injection-molding techniques, the shower module 100 may be molded from a polymeric material such as polyurethane foam having a density equal to or greater than 12 pounds per cubic foot. A lower density polyurethane material would be, most likely, unable to support a connection to the drain.

As shown in FIGS. 11-13, at least one peripheral edge of the floor 110 may not be connected to a sidewall. The absence of at least one wall allows the shower module 1100, 1200 to provide access to physically impaired persons and meets requirements established by the Americans with Disabilities Act (ADA), 42 U.S.C. §§12101-12213 (2000). Any sidewall 104 or combination of sidewalls 101, 102, 103, 104 may be partially or completely omitted by placing at least one insert into the cavity of the tool prior to injecting the polymeric material, at a location corresponding to a sidewall 104 of the ADA shower module 1100, 1200. The insert fills all or a portion of the entire void in the tool intended to form the corresponding sidewall 104, thereby preventing polymeric material from flowing into the void and forming the sidewall 104. In this manner, the manufacturer may create a variety of shower modules 100, 1100, 1200 from the same tool, with the only difference being which portion of an entire sidewall 101, 102, 103, 104 is not included (e.g., a sidewall 103 along a longer side of the shower module 1100, a sidewall 104 along a shorter side of the shower module 1200, two sidewalls 102, 104 on opposite edges of the floor 110 to create a "pass-through" shower module (not shown), or two adjacent sidewalls 101, 102 to create a corner shower module (not shown)). The floor 110 of the ADA shower module 1100, 1200 at the entrance to the shower, after having tile installed on the upper surface 112, is virtually flush with the floor of the bathroom in which the shower module 110, 1200 is installed, or slightly raised. Further, the shower module 1100, 1200 is pitched from the peripheral edges of the floor 110 to the drain aperture 130. In this manner, a wheelchair or other mobility-assisting apparatus (e.g., a walker, crutches, a cane, etc.) may freely enter and exit the shower enclosure.

In a similar manner as described above, the height of a sidewall 104 or combination of sidewalls 101, 102, 103, 104 may be lowered to a height suitable for installing a modular curb 300 adjacent to the shower module 100. At least one insert that runs the entire the length of a sidewall 101, 102, 103, 104, or any portion thereof, is placed inside the cavity of the tool prior to injecting the polymeric material, at a location corresponding to a sidewall 104 of the ADA shower module 1100, 1200. The height of the insert corresponds to the difference in height between a full sidewall 101, 102, 103 and the lowered sidewall 104. The insert partially fills the void in the

tool intended to form the corresponding sidewall **104**, thereby preventing polymeric material from flowing into the void and forming a sidewall **104** having a lowered height. Inserts may be placed within the tool at locations corresponding to any sidewall or combination of sidewalls, thus allowing the manufacturer to create a variety of shower modules with a single tool.

As depicted in FIGS. **14-16**, at least one side wall **104** may include an integrated curb **140** that is molded into the shower module **1500** during fabrication. Similar to the methods described above, the tool may contain voids in the cavity and core, proximate to the location of any sidewall, corresponding to the shape of the integrated curb **140**. The manufacturer merely has to place inserts into the tool at the location of the unwanted curb to prevent the integrated curb from forming.

The use of inserts within the tool allows the manufacturer the flexibility of creating a wide variety of shower modules from a single tool. Each tool is an expensive investment. Additional charges are incurred every time a tool is changed out on the manufacturing line. The time required to change the tool is basically wasted time as the line is shutdown in anticipation of the new tool. Placing inserts into the tool, which are comparatively much less expensive than designing and purchasing individual tools for each permutation of sidewall, also allows for a much shorter downtime during the changeover as less time is required to fit or remove an insert than to completely remove and replace the whole tool. Thus, any combination of placement of sidewalls, height of sidewalls, integrated curbs, length of the shower module, and width of the shower module, may be accomplished using a single tool. Additionally, the dimensions of the shower module may be varied by the addition or subtraction of structural features, such as a curb or curbs, extensions, etc., of the module. In this way, the shower module size can be dictated by the designer in such a way as to fit, when coordinated with a feature such as a bench, into an odd-sized enclosure space.

Tile should be retained on the sidewalls **101, 102, 103, 104** and the upper surface **112** of the floor **110** using a resin based epoxy. The epoxy may contain 100% resin solids or resin solids mixed with a solvent, provided the epoxy contains 60% or more resin solids.

#### Method of Manufacturing.

FIG. **17** illustrates an exemplary logic flow diagram **1700** executed by a manufacturer to implement a method for creating improved prefabricated shower modules suitable for use in constructing a tiled shower as described above. The manufacturer provides (**1702**) a tool for creating the leak-proof shower module **100**. The tool includes a cavity and a core which define a shape corresponding to a shape of the leak-proof shower module **100**. The shower module **100** may contain any, all, or a combination of the features detailed, supra, in Section 1. For example, the manufacturer may provide indentations in the tool that result in the formation of the support ribs **120** or the pitching ribs. The manufacturer may also place one or more inserts into a voided area of the tool (i) that corresponds to a sidewall **101, 102, 103, 104** of the shower module **100**, thereby preventing the polymeric material from filling the voided area during injection molding, or (ii) corresponds to a portion of the length or width of the shower module thereby preventing the polymeric material from filling the voided area during injection molding. In addition, the manufacturer may mold a horizontal fatigue line **108** into one or more sidewalls **101, 102, 103, 104** by creating a raised tab along the length a voided area that corresponds to the sidewall **101, 102, 103, 104** at a height suitable for removing a portion of the sidewall **101, 102, 103, 104** and attaching a modular curb **300**.

Next, the manufacturer inserts (**1704**) one or more forms into the tool between the cavity and the core at the location established for the drain aperture **130** for the purpose of forming the drain aperture **130** in the floor **110** and the drain wall **132** of the shower module **100**. The drain aperture **130** may have a uniform diameter or the drain aperture **130** may have one or more diameters along the bottom portion of the drain aperture **130** for inserting all or a portion of a drain fixture **135** for connecting to the plumbing line, and a wider diameter at the top portion of the drain aperture **130** for inserting all or a portion of a plumbing fixture to accommodate a drain fixture top having a wider or variable diameter. Thus, the form may have a uniform diameter, or may contain a first portion corresponding to a drain fixture shape suitable for connecting to a plumbing line and a second portion corresponding to a drain fixture shape suitable for accommodating a the drain top of drain fixture **135**. Alternatively, two forms may be used, wherein one form corresponds to a shape suitable for connecting to a plumbing line and the second form corresponds to a shape suitable for connecting to a plumbing line. A drain aperture reinforcing structure **136** may also be placed in the drain wall **132** and the floor **110** surrounding the drain aperture **130** to strengthen the area around the drain aperture **130**.

Next, the manufacturer injects (**1706**) a polymeric material into the tool to produce the leak-proof shower module **100**. The polymeric material should be injected into the tool such that the material flows in a direction unimpeded by any support rib **120**. Thus, the polymeric material should flow in a direction parallel, perpendicular, or at an angle of 90° or less to any support rib **120** of the plurality of support ribs **120** or to any pitching ribs **121** of the plurality of pitching ribs **121**.

The shower module **100** is cooled in the tool and as it cools, the polyurethane hardens and cures. Before it is completely cooled and cured, it may be removed (**1708**) from the tool and clamped (**1710**) to a rigid surface (e.g., a table, a workbench, etc.) while the shower module continues to cool (**1712**) and cure. Thus, the possibility of warping or bowing of the lower surface **114** or the upper surface **112** of the floor **110** of the shower module **100** is minimized. Additionally, the shower module **100** may actually spend less overall time in the tool before being removed as the steps taken during post-molding decrease the effects of any warping or bowing, thus allowing the shower module **100** to be removed faster than what would typically be acceptable. Thus, the manufacturing cycle-time per unit is reduced, which may reduce the total cost of the product.

After the shower module **100** has cooled to a solid condition (before or after removing the clamps) the manufacturer may coat (**1714**) the drain wall **132** and an area on the bottom surface **114** of the floor **110** surrounding the drain wall **132** with a fire-retardant material.

Additionally, the shower module **100** may be modified to allow a modular curb **300** to be attached to a sidewall **101, 102, 103, 104** of the shower module **100**. The modification may be made by breaking (**1716**) the selected sidewall **101, 102, 103, 104** along a horizontal fatigue line at a height sufficient to allow attachment of a modular curb **300** thereto, and removing the excess portion. Alternatively, the sidewall **101, 102, 103, 104** may be cut to the appropriate height. Finally, the modular curb **300** is attached (**1718**) to the remaining portion of the sidewall **101, 102, 103, 104** by either the manufacturer (e.g., prior to shipment) or the installer (e.g., in the field).

After fabrication of the shower module **100** having a drain aperture **130** made for a drain fixture **135**, the drain fixture **135** is inserted into the drain aperture **130** and a water-tight seal is

## 11

formed at one or more of (i) the upper surface **112** of the floor **110** at or around the drain aperture **130**, (ii) the drain aperture **130**, and (iii) the lower surface **114** of the floor **110** at or around the drain aperture **130**.

In an alternative embodiment, as illustrated in FIG. **18** by the exemplary logic flow diagram **1800**, a prefabricated drain assembly **134** may be embedded within the floor **110** and drain wall **132** of the shower module **100** during injection molding. Similar to the above process, the manufacturer begins by providing (**1802**) a tool for creating the shower module **100**. The tool includes a cavity portion and a core portion which define a shape corresponding to a shape of the shower module **100**. As above, the shower module **100** may contain any, all, or a combination of the features detailed, supra, in Section 1.

Next, the manufacturer attaches (**1804**) a drain reinforcing structure **136**, which contains an opening in the center, to a prefabricated drain assembly **134** in such a manner that the edges of the interior diameter of the drain reinforcing structure **136** interfere with the outer diameter of the prefabricated drain assembly **134**. The drain assembly **134** with the attached drain reinforcing structure **136** is then inserted (**1806**) inside the tool at a location corresponding to the location of the drain aperture **134** such that the drain reinforcing structure **136** lies in a horizontal plane in an intermediary position between the cavity and the core of the tool. Next, the manufacturer injects (**1808**) a polymeric material into the tool, thereby embedding the drain reinforcement structure **136** in the shower module **100** and integrating the drain assembly **134** within the floor **110** of the shower module **100**. As above, the polymeric material should be injected into the tool such that the material flows in a direction unimpeded by any support rib **120**. The manufacturer removes (**1810**) the integrated shower module **100** from the tool, clamps (**1812**) the shower module **100** to a table (or other rigid surface) to prevent movement, and allows the integrated shower module to cool (**1814**) while still clamped to the table.

The Prefabricated Modular Curb.

Generally, when constructing a tiled shower enclosure, installers build a curb at the intersection of the shower enclosure and the bathroom floor that serves as a dam to prevent water from escaping onto the floor. Typically, the curb was simply constructed by vertically stacking two or three wooden 2×4" boards, covering the boards with a leak-proof liner, and applying tile on top of the liner. At least one prefabricated curb **200**, as illustrated in FIG. **19**, has previously been offered for use in construction of shower enclosures. The prior art curb **200** simply consists of a U-shaped form having a top wall **206**, a front wall **204**, and a rear wall **208**. The distance between the front wall **204** and the rear wall **208** is approximately the width of a standard 2×4 **202**. The prior art curb **200** is typically designed to receive structural support from 2×4's **202** stacked in the same manner as when a curb is constructed manually.

As shown in FIGS. **20-23**, an improved prefabricated modular curb **300** suitable for use in constructing a tiled shower, in conjunction with a shower module **100**, and method of installation is disclosed. The modular curb **300** includes an exterior wall **320**, a top wall **330**, and a mounting wall **310** that engages a sidewall **101**, **102**, **103**, **104** of a shower module **100** when installed proximate to the shower module **100**. The top wall **330** extends perpendicularly from the upper edge of the exterior wall **320** to the upper edge of the mounting wall **310**. Alternatively, the exterior wall **320** may be taller than the mounting wall **310** such that the top wall **330** is pitched to slope downwards toward the sidewall **101**, **102**, **103**, **104** of the shower module **100** when the modular curb

## 12

**300** is installed adjacent to the sidewall **300**. The outer surface of the exterior wall **320** and the outer surface of the top wall **330** are suitable for retaining tile, stone, and/or marble using an epoxy containing 100% resin solids or resin solids mixed with a solvent.

The modular curb **300** may also, but not necessarily, include a bottom wall **340** that extends from the bottom edge of the exterior wall **320** to the bottom edge of the mounting wall **310**, and opposite to the top wall **330**. At least one reinforcing curb rib **350** is attached to at least one of the top wall **330**, the inner surface of the mounting wall **310**, the inner surface of the exterior wall **320**, the bottom wall **340** (if present), or any combination thereof. The reinforcing curb rib **350** runs perpendicular to, parallel to or at an acute angle to the mounting wall **310** or the exterior wall **320**.

The combination of the modular curb **300** with the shower module **100** offers significant improvements over the prior art by combining a leak-proof shower module with an attached leak-proof mounting wall, thereby maintaining the leak-proof quality of the overall shower base system. In addition, the modular curb **300** may be manufactured from a single tool using a combination of inserts. Each insert corresponds to the cross-sectional shape of the modular curb **300**, but has varying lengths. By placing or removing one or more inserts, the length of the prefabricated modular curb **300** may be customized through the manufacturing process. Alternatively, the modular curb **300** may simply be cut to the desired length after fabrication.

In one embodiment, the top wall **330** may include a horizontal lip **360** on the upper surface along the length of one or both ends. The horizontal lip **360** should be at least 1 inch tall and at least 3/8 inches wide so that a standard-sized wallboard may rest on the lip **360**. Additionally, the curb **300** may include a reinforcing curb rib **350** at one or both ends, connected perpendicularly to the exterior wall **320** and to the mounting wall **310** and effectively enclosing the corresponding end.

In another embodiment, the top wall **330** extends beyond the outer surface of the mounting wall **310** to terminate in a ledge **370** having a width substantially equal to the width of the sidewall **101**, **102**, **103**, **104** of the shower module **100** (see FIG. **22**). Thus, when the modular curb **300** is installed adjacent to the shower module **100**, the ledge **370** extends over the top of the sidewall **101**, **102**, **103**, **104** and the outer edge of the ledge **370** is substantially flush with the inner surface of the sidewall **101**, **102**, **103**, **104**.

In an alternative embodiment, as shown in FIG. **23**, the modular curb **300** may also include an attachment feature **316**, **318** located along the outer surface of the mounting wall **310** for engaging a corresponding attachment feature **106** in the sidewall **101**, **102**, **103**, **104** of the shower module **100**. The modular attachment feature **316**, **318** may be a tab, a notch, a slot, a tongue, a groove, a ridge, a peg, an aperture, an interlocking clip, or any combination thereof.

In one embodiment, the modular curb **300** may be constructed using similar polyurethane reaction injection molding techniques as described above in relation to the prefabricated shower module **100**. The process of molding the modular curb **300** faces some similar issues as when molding the shower module **100**. For instance, the direction of flow of the polymeric material should be unimpeded by the reinforcing curb ribs **350** during injection molding in order for the material to flow properly. Thus, the reinforcing curb ribs **350** should run parallel to or at an angle of 90° or less to the direction of flow of polymeric material. Additionally, to provide the proper support, the modular curb **300** should be

13

molded from a polyurethane foam (which may also be fire-retardant) having a density of 12 pounds per cubic foot or greater.

In another alternative embodiment, as shown in FIGS. 24-24A, a prefabricated modular curb 400 includes an outer mounting wall 410, an inner mounting wall 480, an exterior wall 420, and a top wall 430. The top wall 430 is attached substantially perpendicular to the upper edge of the exterior wall 420, to the upper edge of the inner mounting wall, and to the upper edge of the outer mounting wall 410. The inner mounting wall 480 is located at an intermediary point between the outer mounting wall 410 and the exterior wall 420. The distance from the outer mounting wall 410 to the inner mounting wall 480 is slightly greater than the width of a sidewall 101, 102, 103, 104 of the shower module 100, such that when the curb 100 is mounted adjacent to the shower module 100, the sidewall 101, 102, 103, 104 is retained between the outer mounting wall 410 and the inner mounting wall 480. The exterior wall 420 may be the same height or taller than the inner mounting wall 480 so that the top wall 430 is horizontal or slightly pitched towards the shower module 100 upon installation. The outer mounting wall 410 is shorter than the inner mounting wall 480 and should rest on the floor 110 of the shower module 100 upon installation. Additionally, the modular curb 400 may include reinforcing curb ribs 450 attached to at least one of the top wall 430, the inner mounting wall 480, and the exterior wall 420.

FIG. 25 illustrates an exemplary logic flow diagram 2500 executed by a shower enclosure installer to implement a method for constructing a tiled shower enclosure within an area bounded by a subfloor and stud framing using a prefabricated modular curb 300 and a prefabricated shower module 100. The subfloor includes a plumbing connection that leads to a sewer line or septic tank. The installer begins by applying (2502) a quantity of adhesive material on the subfloor within the area bounded by the stud framing. Next, the installer sets (2504) a prefabricated leak-proof shower module 100 in place on the subfloor within the area bounded by the stud framing. The shower module 100 should be positioned on the subfloor such that the support ribs 120 are in supporting engagement with the subfloor, at least one sidewall 101, 102, 103, 104 is substantially adjacent to the stud framing, and the drain assembly 134 is in fluid communication with the subfloor plumbing connection.

The installer then installs (2506) a prefabricated modular curb 300 adjacent to at least one sidewall that is not adjacent to the stud framing. Exemplary methods of installing the prefabricated modular curb 300 are detailed in the logic flow diagrams of FIGS. 26 and 27. Following the steps for implementing the method detailed by logic flow diagram 2600, the installer applies (2602) a quantity of adhesive material to the outer surface of the sidewall 101, 102, 103, 104 and sets (2604) the modular curb beside the sidewall 101, 102, 103, 104 such that the mounting wall 310 of the modular curb 300 is proximate to the sidewall 101, 102, 103, 104 and the top wall 330 is positioned at the same level or above the top edge of the sidewall 101, 102, 103, 104. Next, the installer seals (2606) any gap between the mounting wall 310 and the sidewall 101, 102, 103, 104 using an epoxy based adhesive to form a water-tight, leak-proof seal. Additionally, or alternatively, the installer may fasten (2608) the modular curb to the subfloor, the framing studs, or the sidewall 101, 102, 103, 104 using brackets 380 and screws 382 or any other traditional fasteners (e.g., screws, nails, rivets, etc.). In the finished tiled shower enclosure, the fasteners are completely hidden from view by the application of tile.

14

Alternatively, the installer may set (2702) the prefabricated modular curb 300 adjacent to the sidewall 101, 102, 103, 104 such that an attachment feature 106 (e.g., a tab, a notch, a slot, a tongue, a groove, a ridge, a peg, an aperture, an interlocking clip, etc.) along an outer surface of the sidewall 101, 102, 103, 104 engages with a corresponding attachment feature 316, 318 along the outer surface of the mounting wall 310 of the modular curb 300. The installer may also connect the modular curb 300 to the sidewall 101, 102, 103, 104 of the shower module 100 by inserting one or more screws 382 through the ledge 370, engaging the sidewall 101, 102, 103, 104, as shown in FIG. 22.

Referring back to FIG. 25, after installing the modular curb 300, the installer then attaches (2508) wallboard to the framing such that a lower edge of the wallboard rests above and is flush with any sidewall 101, 102, 103, 104 adjacent to the stud framing. Finally, the installer installs (2510) tile on the wallboard, the module sidewalls 101, 102, 103, 104, the floor 110, and the modular curb 300, thereby resulting in a tiled shower.

The Shower Bench and Ledge.

Another component of the leak-proof modular shower enclosure system includes a shower bench or ledge, as illustrated in FIGS. 28-30. The combination of the bench and ledge with the shower module 100 offers significant improvement over prior art by attaching a leak-proof shower bench or ledge to a leak-proof shower module, at an attachment point that is also leak-proof, thereby maintaining the leak-proof integrity of the shower base system. In addition, the shower bench and shower ledge may each be made in their own tool using a combination of inserts, which permit the shower bench and the shower ledge to be made with a variable height, variable length, and variable depth so that the shower bench and the shower ledge can be customized either through the manufacturing process or after fabrication by cutting the shower bench and the shower ledge to the desired dimensions. The term "shower ledge" includes any structure, regardless of specific height, width, or length and having a substantially horizontal surface, for use in constructing a tiled shower enclosure. A "shower ledge" may or may not be intended to support the weight of a person or persons. Thus, the use of the term "shower bench," as used in the context of the following discussion is interchangeable with the term "shower ledge." Typically, a "shower bench" is simply a shorter version of a "shower ledge."

In one embodiment, the shower bench 500 is designed for installation between the shower module 100 and a stud-framed wall of the tiled shower enclosure. The shower bench 500 may include a rectangular seating member 510, as shown in FIG. 28, connected to an upper edge of a sidewall 520 along each peripheral edge. The length of the shower seat 500 is preferably equal to either the width or the length of the corresponding shower module 100 with which the shower bench 500 will be installed. The lower edge of each sidewall 520 terminates in a common plane that either rests on the subfloor of the shower enclosure or connects to a corresponding peripheral edge of an optional bottom plate 540. The seat 500 may be tilted slightly from a horizontal plane to that water may run off of this seat (on the tile applied thereto).

One sidewall 520 is divided into an upper portion 522 and a lower portion 524, wherein the lower portion is set back from the upper portion 522 along the entire length of the shower bench 500. The lower portion 524 is taller than the height of a sidewall 101, 102, 103, 104 of the shower module 100, and is set back from the upper portion 522 a distance slightly greater than the thickness of the sidewall 101, 102, 103, 104 of the shower module 100. In this manner, when the shower bench 500 is installed adjacent to the sidewall 101,

15

102, 103, 104 of the shower module 100 such that the sidewall 101, 102, 103, 104 of the shower module 100 resides within the setback area, thereby preventing the weight of the shower bench 500 from resting on the sidewall 101, 102, 103, 104 of the shower module 100. Additionally, as shown in FIG. 30, the outer surface of the upper portion 522 of the shower bench sidewall 520 should be flush (i.e. substantially coplanar) with the inner surface of the sidewall 101 so that when tile 505 is installed to form the final shower enclosure, the transition between the shower module 100 and the shower bench 500 is unnoticeable.

In an alternative embodiment, as shown in FIG. 29, the shower bench 600 includes a triangular seating member 610 connected to an upper edge of a sidewall 620 along each peripheral edge. The seating member 610 may be any geometric shape suitable for forming a shower enclosure. Similar to shower bench 500, one sidewall 620 is divided into an upper portion 622 and a lower portion 624, wherein the lower portion is set back from the upper portion 622 along the entire length of the shower bench 600, allowing the shower bench 600 to be installed adjacent to a prefabricated shower module 100 without the weight of the shower bench resting upon the sidewall 101, 102, 103, 104 of the shower module 100.

In one embodiment of the present invention, the shower bench 500 may include at least one support rib 530 attached to at least one of the seating member 510, any side wall 520, and the bottom wall, or any combination thereof, and extending downward to terminate coplanar with the lower edge of each sidewall. Each support or reinforcing rib runs parallel to, perpendicular to, or at an acute angle to, any side wall 530.

When installed, the seating member 510 may be horizontal or pitched downwards toward the prefabricated shower module 100. Additionally, the seating member 510 may include one or more sidewall or horizontal lip 550 at least 1 inch tall and at least  $\frac{3}{8}$  inches wide along at least one peripheral edge to allow for a standard-sized wallboard to rest on the lip 550.

The seating member and at least the upper portion 522 of the sidewall 520 adjacent to the sidewall 101, 102, 103, 104 of the shower module 100 have surfaces suitable for retaining tile, stone, or marble using an epoxy containing 100% resin solids or resin solids mixed with a solvent.

In one embodiment, the shower bench 500 may be constructed using similar polyurethane reaction injection molding techniques as described above in relation to the prefabricated shower module 100 and the modular curb 300. As in the case of the shower module 100 and the modular curb 300, the direction of flow of polymeric material should be unimpeded by the support ribs 530 during injection molding in order for the material to flow properly. Thus, the support ribs 530 should run parallel to, perpendicular to, or at an angle of 90° or less to the direction of flow of polymeric material. Additionally, to provide the proper support, the shower bench 500 should be molded from a polyurethane foam (which may also be fire-retardant) having a density of 12 pounds per cubic foot or greater.

FIG. 31 illustrates an exemplary logic flow diagram 3100 executed by a shower enclosure installer to implement a method for constructing a tiled shower enclosure within an area bounded by a subfloor and stud framing using a prefabricated shower bench 500, a prefabricated shower module 100, and optionally, a prefabricated modular curb 300. FIG. 32 illustrates an exemplary finished shower enclosure created using embodiments of the prefabricated shower bench 500, the prefabricated shower module 100, and the prefabricated modular curb 300 as disclosed by the present invention. The installer begins by mounting (3102) a prefabricated shower bench 500, adjacent to the stud framing such that a bench

16

sidewall 520 that has a lower portion 524 set back from an upper portion 522 is facing the area where the shower module 100 is to be installed. The shower bench may be fastened to the stud framing using traditional fastening techniques (e.g., braces, screws, nails, adhesives, etc.). Thus, when someone sits on the shower bench 500, the person's weight is supported by both the bench support ribs 540 and the stud framing and not distributed to the shower module 100.

Next, the installer applies (3104) a quantity of adhesive material on the subfloor within the area bounded by the stud framing and the shower bench 500, and sets (3106) the shower module 100 in place on the subfloor within the area bounded by the stud framing and the shower bench 500. The shower module 100 is positioned on the subfloor such that at least one module sidewall 101 is substantially adjacent to the stud framing, and a second module sidewall 102 rests underneath the lower portion 524 of the bench sidewall 520. The inner surface of the second module sidewall 102 is flush with an outer surface of the upper portion 522 of the bench sidewall 520, and the drain assembly is in fluid communication with the subfloor plumbing connection. The installer may also, optionally, attach a prefabricated modular curb 300 to a third sidewall 104 using techniques described, supra, in Section 3 or use a shower module 1400, 1500 with an integrated curb 140.

Finally, the installer attaches (3108) wallboard to the framing such that a lower edge of the wallboard rests above and is flush with the first module sidewall 101, and finishes the shower enclosure by installing (3110) tile, stone and/or marble on the wallboard, the module sidewalls 101, 102, 103, 104, the floor 110, the optional modular curb 300, and the prefabricated shower bench 500.

All features of the shower bench 500 and corresponding methods of installation described herein may be equally applied to creating a shower ledge simply by extending the height of the sidewalls 520.

#### Improved Shower Bench and Ledge.

A modified version of the leak-proof modular shower enclosure system shown in FIGS. 28-30 includes a shower bench, as illustrated in FIGS. 33-37. The combination of the bench with the shower module 100 offers significant improvement over prior art by attaching a leak-proof shower bench to a leak-proof shower module, at an attachment point that is also leak-proof, thereby maintaining the leak-proof integrity of the shower base system. In addition, shower benches and/or ledges having varied dimensions, shapes and features may be made in a single tool using a combination of removable inserts, which permit shower benches and/or shower ledges to be made in various heights, various lengths, and various depths by a single base tool so that the shower bench and/or ledge can be customized either through the manufacturing process or after fabrication by cutting the shower bench and/or the shower ledge to the desired dimensions.

In one embodiment, a shower bench skin or shell 700 is designed for installation between a shower module 100 and a stud-framed wall (not shown) of the shower enclosure. The shower bench 700 may include a rectangular seating member 710 connected to an upper edge 712 of a sidewall 720. The length of the shower seat 700 is preferably equal to either the width or the length of the corresponding shower module 100 with which the shower bench 700 will be installed, although it will occur to those of skill in the art that the shower bench may be any desired length, width or height and still fall within the scope of the invention. The lower edge of each sidewall 720 terminates in a plane that either rests on the subfloor or

17

the shower enclosure, or mates or aligns with an upper edge of a corresponding sidewall of module **100** (FIGS. **38-39**, to be discussed supra).

In this particular embodiment, one sidewall **720** is divided into an upper portion **722** and a lower portion **724**, wherein an area of the lower portion is recessed or set back from the upper portion **722** along the entire length of the shower bench **700**. The lower portion **724** is taller than or equal to the height of a sidewall **101**, **102**, **103**, **104** of the shower module **100**, and is set back from the upper portion **722** an equal distance or a distance which is slightly greater than the thickness of the sidewall **101**, **102**, **103**, **104** of the shower module **100**. In this manner, when the shower bench **700** is installed adjacent to the sidewall **101**, **102**, **103**, **104** of the shower module **100** the sidewall **101**, **102**, **103**, **104** of the shower module **100** resides within the setback area, thereby preventing the weight of the shower bench **700** from resting on the sidewall **101**, **102**, **103**, **104** of the shower module **100**. Additionally, as shown in FIG. **30**, the outer surface of the upper portion **722** of the shower bench sidewall **720** should be flush (i.e. coplanar) with the inner surface of the sidewall **101** so that when tile is installed to form the final shower enclosure, the transition between the shower module **100** and the shower bench **700** is unnoticeable.

As shown in FIGS. **38** and **39**, an alternative bench **800** is employed, wherein the recessed portion **724** of sidewall **720** is deleted, such that sidewall **101** of module **100** will end in an upper, substantially horizontal, edge **821** which will mate substantially in registry with a corresponding lower edge **856** of lower bench sidewall **822**. Bench **800** includes a substantially horizontal seating member **810**. In this embodiment, sidewall portion **822** terminates in the vicinity of upper edge **821** of module sidewall **101**.

Seating area **810** of bench **800** is substantially horizontal, but preferably is slightly tilted off of the horizontal so that water will readily drain therefrom toward module **100**. Bench **800** may also include integral sidewalls **806** extending substantially vertically upwardly from seating section **810**. A support structure **760** should be used to support bench **800** in position in the shower enclosure. Support **760** may take the form of various frame members, ribs molded into bench **800** which extend from the underside of seating member **810** to the floor of the enclosure, or any other structure suitable to support bench **800** and any loads which are reasonably expected to be imposed thereon. The support **760** may, as stated above, be molded together with bench **800** during manufacture as an integral unit therewith, the support may be manufactured separately and installed in the shower enclosure prior to installation of the bench thereon, or the support **760** may be assembled in the field by construction workers or a home remodeler. Preferably, bench **800** is fastened to support **760** using suitable connection structure, such as fasteners, epoxy adhesive, polyurethane glue, or the like as will occur to those of skill in the art. Support **760** may take the form of the support members shown in FIG. **38**, which may be 2x4 lumber, aluminum wall studs, or the like, and plywood sheeting as deemed necessary by the designer. Support **760** also forms a portion of the support for shower module **100**. Frame **760**

At the juncture of sidewall **822** and module sidewall **101**, a waterproofing flashing **830** may be employed. The flashing **830** functions to prevent water which may be running down wallboard **825** or sidewall **822** from getting behind sidewall **820** or sidewall **822**, causing water damage. Flashing **830** can take any of the forms of the flashing disclosed in my co-

18

pending application filed on even date herewith, and the disclosure thereof is hereby incorporated by reference herein as though fully disclosed herein.

Installation of flashing **830** between sidewall **806** of shower bench **800** and wallboard **825** may be carried out in like manner to that described above. Obviously, instead of attaching flashing **830** to the bench support structure **760**, flashing **830** is connected to the shower enclosure stud framing **S** after the bench is installed, and sheet rock **825** installed thereover. Thinset and tiling is applied thereafter as will occur to those of skill in the art. The flashing should be sized in a thickness such that the tiling will create a smooth, coplanar, surface over the juncture of wallboard **825** with flashing **830**.

In the preferred embodiment, flashing member **830** is preferably "z" shaped, comprised of a central flat horizontal member **832**, a downwardly extending horizontal proximal leg member **834** connected at a proximal edge **833** of horizontal member **832**, and an upwardly extending distal leg member **836** connected to a distal edge **835** of horizontal member **832**. In its assembled form, flashing member **830** is attached (via fastener, adhesive or any suitable connecting structure **891**) to support **760**, or shower enclosure wall stud-framing members **S**, or any other suitable supporting device, prior to installation of the bench **800**, but preferably before installation of module **100**. Horizontal flashing member **832** is positioned on top and preferably, but not by way of limitation, in contact with upper module sidewall peripheral edge **821**. Bench **800** is then installed, and thinset or other tile adhesive material applied there over, and tiles or other finishing material placed there over.

As can be appreciated, the thickness of flashing **830** should be sized so as not to have any appreciable affect on the thinset layer so that tiles can be placed across the intersection of wallboard **825** with module sidewall **101** without any undulation.

Also, the height of upstanding leg **836** of flashing **830** can be any suitable height, and is preferably in the range of 1/4" to 6". The width of horizontal member **832** should be sized so as to substantially coincide with the thickness of module sidewall **101** and/or wallboard **825**. The height of depending leg **834** can be any height, e.g. 1/16 inch.

The function of flashing **830** is to prohibit water which has intruded behind tiles into and/or behind the thinset layer from traveling behind wallboard **825** or module sidewall **101**. This occurs due to the vertical member **836** acting as a barrier to water which has seeped into any gap between peripheral edge **826** of wallboard **825** resulting from the downflow of water due to gravity. Any such water will be constrained to the space **845** between wallboard **825** and vertical flashing member **836**.

#### Design and Construction of Shower Bath Enclosures

The process for designing and building a shower or bath enclosure in accordance with this invention includes installing wall stud framing members to generally frame out the space within which the shower enclosure will reside, installing a frame **760** upon which bench **800** will be placed, the frame being placed adjacent to wall studs **S** and, preferably, being attached thereto in any suitable manner which will occur to those of skill in the art (such as by adhering frame **760** to the sub-floor using mortar or the like), installing waterproof shower or bath module **12** on the subfloor, preferably in a mortar or other material which will stabilize and fix the module **12** in place, the sidewall **101** of module **12** being placed adjacent to frame **760**, attaching flashing **830** to frame **760** such that lower leg **834** of flashing **830** hangs down over sidewall **101** of module **12**, placing bench **800** on frame **760** such that lower edge **856** of bench sidewall **822** is placed



19

substantially in registry with top edge **821** of module sidewall **101** with horizontal flashing portion **832** sandwiched therebetween, attaching upper bench flashing **830** to wall studs **S**, for example by using the vertical sidewall **806** of bench **800**, installing wallboard **825** such that the lower edge of wallboard **825** is placed substantially in registry with a corresponding upper edge of sidewall **806**, and tiling over or otherwise finishing the entire surface of module **12**, bench **800** and wallboard **825** to complete a shower or bath enclosure. It should be noted that the order of the foregoing steps may be modified at the discretion of the installer, the particular order recited above being but a mere example of an installation process.

A bench shell **800** in accordance with this invention may be installed adjacent to one or more panels of glass to act as a shower or bath wall or partition, such that a bottom edge of the glass sits on, and is supported by, the bench seat **710**, **810**, or on one or more of sidewalls **730**, **806**.

As described above, the present invention encompasses a modular system for creating a tiled shower or bath enclosure including one or more component pieces (e.g., a prefabricated shower module with or without an integrated curb, a prefabricated modular curb, a prefabricated shower bench, and a prefabricated ledge), and methods of designing and installing the relative positioning of the associated component pieces, in a shower enclosure space which does not conform precisely to the dimensions of the component pieces (e.g. shower module and bench) used to create the finished shower or bath. With this invention, designers will be able to use space in a floor plan that would otherwise have been unusable, while at the same time having the flexibility of specifying standardized components for the shower or bath. Moreover, manufacturers will be able to satisfy a demand for a greater variety of prefabricated shower or bath components without the need to invest in the manufacture of a greater variety of products. Additionally, the system offers tremendous flexibility in employing numerous combinations of component pieces, thereby providing many more options for creating modular shower or bath enclosures. The system may be installed in the field in a fraction of the time required using traditional prior art methods, which greatly assists installers and contractors when building multiple enclosures (e.g., newly constructed condominiums, apartment buildings, hotels, dormitories, prisons, pre-manufactured housing, etc.).

Reference hereinafter to "shower" is intended to encompass "shower or bath." The need being addressed can best be understood by viewing FIGS. **40A**, **40B**, **41A**, **41B**, **42A** and **42B** and assuming a shower enclosure space **A** having a length  $D_1$  and a width  $D_2$  within which the shower enclosure components, whatever they may be (e.g. shower module, shower bench, shower soap/shampoo ledge, etc.), must fit. It is to be understood, however, that the enclosure space **A** may be of any form, whether square, rectangular, other polygon, circular, free-form, etc. The enclosure space **A**, the footprint of which will typically be surrounded by wall studs **S** and the right edge of curb **140** of shower module **100** for a rectangular shaped space **A**, can be seen in FIGS. **40B**, **41B** and **42B**. Often, the architect, engineer or designer designing an overall floor plan or portion thereof will be left with a predetermined amount of space, i.e. the footprint hereinabove described, within which to fit the shower enclosure components. Those components will typically consist of a shower module **100**, a modular prefabricated waterproof shower bench **1130**, dry-wall or other wall-forming substrate **1155**, and finishing tile or other surface-finishing material **1160**.

As best seen in FIGS. **40A**, **40B**, **41A**, **41B**, **42A**, **42B**, and **43**, enclosure space **A**, which is the area in which a shower or

20

bath is to be constructed, is defined by a length  $D_1$  and width  $D_2$ . IN the embodiment shown in FIGS. **40A-42B**, the components which are included in the shower or bath construction will include a shower bench **1130**, which has an overall length  $D_4$ , and a shower module **100**, which has an overall length  $D_5$ . In addition, when module **100** is placed within enclosure **A** such that the right edge of curb **140** (i.e. shower module sidewall **101**) is at the rightmost edge of enclosure **A**, as is the case in FIGS. **40A-42B**, the distance remaining between the leftmost sidewall **103** of module **100** and leftmost wall studs **S** is  $D_3$ . In the preferred embodiment, shown in FIGS. **40A** and **40B**, the length  $D_5$  of module **100** combined with the length  $D_3$  of bench **130** will be the same as length  $D_1$ , such that:

$$D_3 + D_5 = D_1$$

where  $D_3 = D_4$ .

In other embodiments, that is where  $D_3$  does not equal  $D_4$ , a gap between the left edge of sidewall **103** and leftmost wall studs **S** space is created, which must be covered to create a finished shower or both enclosure. In that event, either the bench seat **1132** must be reduced in size so that  $D_3$  will be made equal to  $D_4$ , or the bench **1130** must be overlapped with module **100**, examples of which are shown in FIGS. **41A-B** and **42A-B**. Alternatively, the designer could specify that the length of seat portion **1132** of bench **1130** can be manufactured to coincide with the length  $D_3$  of the space between left most side wall **103** and left most wall studs **S**. The latter configuration would be most achievable in the case of the original manufacture or renovation of a multi-unit housing/hotel complex, where the shower enclosure length  $D_1$  is constant for a large number of condo/apartment/hotel units.

The length  $D_4$  of bench seat **1132** can be set during the manufacturing process to conform to the dimension  $D_3$  needed to fill the space remaining between sidewall **103** and wall studs **S** much more simply than to custom make a shower floor module **100**, as the molds used for each shower module vary significantly, and it is simply easier to modify tooling for a shower bench such as bench **1130** than it is to modify the tooling for a shower floor module. Therefore, it is preferred to manufacture or select a pre-existing bench having a depth equal to  $D_3$ . In this way, the standard depths  $D_5$  in which shower modules are manufactured can be retained, thereby greatly reducing what would otherwise be the cost of custom manufacturing shower modules to fit the nearly infinite number of possible shower enclosure space depths  $D_1$  while simultaneously increasing the flexibility that the designer has to maximize the utilization of the overall floorplan space in which the shower is to be constructed.

Referring now to FIGS. **40A** and **40B**, there is shown a first, and preferred, installation configuration of the invention, wherein the dimensions  $D_1$  and  $D_2$  of the enclosure **A** create a footprint, i.e. surface area/shape, on the subfloor **F** that is larger than the area covered by shower module **100** when viewed from above, as shown in FIGS. **40A-B**. The enclosure **A** is bounded below by the bathroom subfloor **F** and on the sides by wall studs **S** or other framing structure, although at least a portion of one side of the enclosure space will be bounded by the shower opening or threshold, such as curb **140**, through/over which the person using the shower will enter the enclosure. Typically, the threshold of shower module **100** will be curved at **140**, although that area of the module **100** may be barrier-free, such that it will be substantially coplanar with the shower subfloor **F**, be ramped, define a slightly raised water barrier, or any other configuration defining a threshold between the shower and the adjacent bathroom.



21

Flashing **140**, **142** is fully disclosed in my related application entitled "Waterproof Juncture" which is the subject of U.S. patent application Ser. No. 12/435,959, filed on May 5, 2009, disclosure of which is incorporated by reference as though fully set forth therein. Preferably but not by way of limitation, flashing **140**, **142** may be formed as a Z-shaped member having a central, generally horizontally disposed, central member **1032**, a downwardly depending front member **1034** which ends in a lower edge **1035**, and an upwardly extending rear member **1038** ending in and upper edge **1039**.

In the above described circumstance, since the module **100** is not large enough to fill the entire surface area within the enclosure A, that is, the length  $D_1$  of the enclosure A is larger than the length  $D_5$  of the shower module **100** by a distance  $D_3$ , something must be added to occupy the open space, i.e. the space between the sidewall **103** of module **100** at the leftmost end of module **100** shown in FIG. **40B** and the wall studs S on the left side of FIGS. **40A** and **40B**. To complete the construction of the shower, therefore, a shower component such as a waterproof bench **1130** is added. Such a bench is preferably of the prefabricated variety, but may also be constructed on site. A prefabricated bench which is suitable for use with the instant invention comprised of a substantially horizontal seat member **1132**, a generally vertically extending leg wall section **1134**, and a generally vertically upwardly extending back rest or splashwall section **138**. As is the case with the configuration shown in FIG. **40A**, leg wall **1134** extends downwardly such that it can be placed in registry with an upper edge of shower module sidewall **103** when bench **1130** is placed upon bench support apparatus **1150**. Support apparatus **1150** may take any form, or be made of any material, suitable under the circumstances to support bench **1130** in association with wall studs S and module sidewall **103**. Such support apparatus **1150** may even be formed integrally with, or attached to, bench **1130**. Preferably, but not by way of limitation, support **1150** is placed in abutting relationship with shower module **100** such that sidewall **103** is adjacent thereto and can be secured thereto by adhesive or other mechanical fastening means. Other suitable prefabricated benches are disclosed in my co-pending application Ser. No. 12/463,803 entitled "Improved Method of Manufacturing and Installation of Prefabricated Shower Benches and Associated Shower Benches", filed May 11, 2009, the disclosure of which is incorporated by reference herein as the fully set forth herein.

Waterproofing, such as flashing **140**, **142**, may be employed at the juncture of wallboard **1155** with splashwall **1138**, and between the lower terminal end of legwall **1134** and upper end of sidewall **103**, respectively. Backrest/splashwall **1138** of bench **1130** is adapted to be placed in registry with drywall **1155** or other wall-forming substrate.

As best shown in FIGS. **41A** and **41B**, there may be instances where a designer specifies a standard shower module **100** and a standard bench **1130**, such that the combined lengths  $D_4$  of the bench and  $D_5$  of the shower module exceed the length  $D_1$  of the shower space A (i.e. length  $D_3$  and  $D_4$  are different). In this case, legwall **1134** will not be placed in registry with sidewall **103**, but will, instead, be positioned somewhere between sidewall **103** and drain **123**. In this event, it is desirable, but not required, to raise the level of the module floor **110** in the area **1158** residing between sidewall **103** and legwall **1134** to be of a height at least slightly greater than the top of the floor tiles **1160**. In this way, any water which may intrude behind legwall **1134** will tend to flow toward drain **123**.

Another configuration is shown in FIGS. **42A** and **42B**, wherein distance  $D_3$  is nominal enough such that bench sup-

22

port **1150** can only fit within the confines of floor module **100**. Bench support **1150**, in this case, may be placed and/or affixed to floor **110** of floor module **100** and bench **1130** placed or connected thereon in the manner described herein or as will occur to those of skill in the art. Legwall **1134** may be manufactured to extend to floor **110**, or may be lengthened in the field by the addition of drywall or other planar matter to simulate an extension to legwall **1134**.

A preferred implementation of the invention includes the following steps: determine and/or receive shower enclosure space dimensions (i.e. the dimensions of footprint A); (steps **4102**); select and/or receive a shower module from the available supply of shower modules that most closely fits the footprint A without exceeding the size of the footprint (step **4104**); determine if the shower module fits the footprint (such that there is no space or gap remaining between wall studs S and any one of sidewalls **102**, **103** or **104**) (step **4106**); if the shower module does not fit (i.e. substantially fill space A), select one or more prefabricated shower components to fill the space(s) (step **4110**). Such shower components, as stated previously, may be in the form of one or more shower benches, shower ledges or the like. The step **4102** of receiving shower enclosure space dimensions corresponding to the footprint A can be carried out by the designer, architect, engineer, etc. being given those dimensions or that person actively seeking out those dimensions or otherwise ascertaining them. The step **4104** of selecting a prefabricated shower module can be carried out by looking to any supplier of prefabricated shower modules. The step **4110** of selecting one or more prefabricated shower components to fill the remaining space, if any, in the enclosure A can be fulfilled in any number of ways. For example, the designer, architect or engineer may specify a predetermined size of shower bench which is readily available on the market from any number of suppliers if more than one, or the designer may specify a particular dimension or dimensions for such a shower bench to be manufactured in.

As can be seen in FIGS. **42A** and **42B**, bench **1130** may be placed entirely within the confines of shower module sidewalls **101**, **102**, **103** and **104**, especially where the sidewall **103** rests against or near the leftmost wall studs S. In such an embodiment, support structure **1150** will be placed/built upon floor **110** of shower module **100**, where sidewall **103** of shower module **100** is placed near wall studs S. As in the embodiment shown in FIG. **41A**, the floor area **1158** of module floor **110** between sidewall **103** and legwall **1134** should, preferably, be raised so as to prevent the accumulation of water thereon.

It is to be further understood that sidewalls **102** and **104** of module **100** may also not abut studs when the module is placed within the enclosure, such that the space there between must also be filled with a shower component such as a bench or ledge in the manner disclosed herein.

In the foregoing specification, the present invention has been described with reference to specific embodiments. However, one of ordinary skill in the art will appreciate that various modifications and changes may be made without departing from the spirit and scope of the present invention as set forth in the appended claims. Accordingly, the specification and drawings are to be regarded in an illustrative rather than a restrictive sense, and all such modifications are intended to be included within the scope of the present invention.

Benefits, other advantages, and solutions to problems have been described above with regard to specific embodiments of the present invention. However, the benefits, advantages, solutions to problems, and any element(s) that may cause or result in such benefits, advantages, or solutions to become more pronounced are not to be construed as a critical,

## 23

required, or essential feature or element of any or all the claims. The invention is defined solely by the appended claims including any amendments made while this application is pending and all equivalents of those claims as issued.

What is claimed is:

1. A process for transforming an enclosure space into a shower or bath enclosure space, the enclosure space defined by a boundary, comprising the steps of:

determining proposed dimensions of the enclosure space;

selecting a prefabricated floor module, said module comprising a floor and at least one sidewall extending upwardly therefrom, said module defining an outer peripheral edge and being adapted to be placed within the enclosure space wherein the outer peripheral edge of the floor module defines an area that is substantially smaller than an area defined by the boundary of the enclosure space;

selecting a shower bench to occupy at least a portion of any open space(s) between the outer peripheral edge of the floor module and the boundary of the enclosure space;

said bench comprising a seat and a legwall extending downwardly from the seat, the legwall defining a lower legwall edge;

said sidewall defining an upper sidewall edge; installing the bench in such a way that the lower legwall edge rests substantially in registry with the upper sidewall edge; and

installing at least one of tile, stone and marble on a wallboard, the module, and the shower bench, thereby resulting in a tiled shower;

wherein at least one surface of the legwall and at least one surface of the sidewall are substantially co-planar.

2. The method of claim 1, further comprising:

attaching the wallboard in the enclosure space such that a lower edge of the wallboard rests above and is in substantially in registry with an upper peripheral edge of a sidewall of the bench; and

installing at least one of tile, stone and marble on the wallboard, the module, and the shower bench, thereby resulting in a tiled shower.

3. A shower or bath enclosure installed in an enclosure space, the enclosure space defined by a boundary, comprising:

a prefabricated floor module, said module comprising a floor and at least one sidewall extending upwardly therefrom, said sidewall defining an upper sidewall edge, said module defining an outer peripheral edge and being sized and shaped to define an area that is substantially smaller than an area defined by the boundary of the enclosure space, thereby leaving an open area between the outer peripheral edge of the module and the boundary of the space; and

a shower bench which occupies at least a portion of the open area;

said bench comprising a seat and a legwall extending downwardly from the seat, the legwall defining a lower legwall edge;

the lower legwall edge resting substantially in registry with the upper sidewall edge;

wherein at least one surface of the legwall and at least one surface of the sidewall are substantially co-planar.

4. The enclosure of claim 3, further comprising:

a bench backrest extending upwardly from the seat, the backrest defining an upper backrest edge; and

## 24

wallboard attached to studs within the enclosure space such that a lower edge of at least a portion of the wallboard rests substantially in registry with the upper backrest edge.

5. The enclosure of claim 4, wherein at least one of tile, stone and marble is attached to one or more of the wallboard, the module, and the shower bench, thereby resulting in a tiled enclosure.

6. A method of installing a tiled shower within an enclosure space bounded by a subfloor and wall studs, the space defined by a boundary, the method including the steps of:

placing a prefabricated shower module in the enclosure space, said module comprising a floor and at least one sidewall extending upwardly therefrom, said sidewall defining an upper sidewall edge, said module defining an outer peripheral edge, an area defined by said module being smaller in at least one dimension than an area defined by the boundary, thereby leaving open area between the outer peripheral edge of the module and the boundary of the space;

placing a prefabricated shower bench in the enclosure space so that the shower bench covers at least a portion of the open area between the outer peripheral edge of the shower module and the boundary of the enclosure space; said bench comprising a seat and a legwall extending downwardly from the seat, the legwall defining a lower legwall edge; and

installing the bench within the enclosure such that the lower legwall edge rests substantially in registry with the upper sidewall edge;

wherein at least one surface of the legwall and at least one surface of the prefabricated shower module are substantially co-planar.

7. The method of claim 6, further comprising:

a backrest extending upwardly from the seat, the backrest defining an upper backrest edge, attaching wallboard to the enclosure such that a lower edge of the wallboard is substantially in registry with the upper backrest edge.

8. The method of claim 7, further comprising installing at least one of tile, stone and marble on the wallboard, the module, and the prefabricated shower bench, thereby resulting in a tiled enclosure.

9. A method of installing a tiled shower within an enclosure space bounded by a subfloor and wall studs, the subfloor including a plumbing connection communicating with a sewer line, the space defining a boundary, the method including the steps of:

placing a prefabricated shower module in the enclosure space, said module defining an outer peripheral edge, said module including a floor section and at least one sidewall extending upwardly from the floor section, the at least one sidewall ending in an upper sidewall edge; an area defined by said module being smaller in at least one dimension than an area defined by the boundary, thereby leaving a gap area between said at least one sidewall of the shower module and at least one of said wall studs; and

placing a shower bench in the enclosure space such that the shower bench covers at least a portion of the gap area; said bench comprising a seat and a legwall extending downwardly from the seat, the legwall defining a lower legwall edge;

said bench further comprising a bench base adapted to support the bench seat and legwall above the subfloor; the lower legwall edge resting substantially in registry with the upper sidewall edge;

## 25

wherein at least one surface of the legwall and at least one surface of the sidewall are substantially co-planar.

**10.** The method of claim **9**, further comprising:

a backrest extending upwardly from the seat, the backrest defining an upper backrest edge, attaching wallboard to the enclosure such that a lower edge of the wallboard rests above and is substantially in registry with the upper backrest edge.

**11.** The method of claim **10**, further comprising installing at least one of tile, stone and marble on the wallboard, the module, and the shower bench, thereby resulting in a tiled enclosure.

**12.** The method of claim **10**, wherein the sidewall and the wallboard do not lie in the same plane.

**13.** A process for transforming an enclosure space into a shower or bath enclosure, the enclosure space defined by a boundary, comprising the steps of:

determining proposed dimensions of the enclosure space; specifying a prefabricated floor module, said module comprising a floor and at least one sidewall extending upwardly therefrom, said sidewall defining an upper sidewall edge, said module defining an outer peripheral edge adapted to be placed within the enclosure space wherein the outer peripheral edge of the floor module defines an area that is smaller than an area defined by the boundary of the enclosure space;

## 26

specifying a shower bench to occupy at least a portion of any open space(s) between the outer peripheral edge of the floor module and the boundary of the enclosure space, the bench comprising a seat and a legwall extending downwardly from the seat, the legwall defining a lower legwall edge; and

specifying the placement of the bench within the enclosure such that the lower legwall edge rests substantially in registry with the upper sidewall edge and at least one surface of the legwall and at least one surface of the sidewall are substantially co-planar.

**14.** The method of claim **13**, further comprising:

a backrest extending upwardly from the seat, the backrest defining an upper backrest edge, specifying wallboard to be attached to the enclosure such that a lower edge of the wallboard rests above and in substantial registry with the upper backrest edge.

**15.** The method of claim **14**, further comprising specifying the installation of at least one of tile, stone and marble on the wallboard, the module, and the shower bench, thereby resulting in a tiled enclosure.

**16.** The method of claim **14**, wherein the sidewall and the wallboard do not lie in the same plane.

\* \* \* \* \*